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Table of Contents

NEWS DEVELOPMENTS

Rumors of Early Price Decision Premature or Unfounded .. 18
Knowlton and Pike Clash Over Benefits of Price Advance .. 18
Acute Position of Crude-Oil Supply Outlined Before Compact 20
Faith Expressed by Pyle in California Petroleum Reserves .. 21
Majewski Warns of Sharper Rationing 21
Pride in War Accomplishments Expressed Before N.P.A. 22
DSC Pays $253,912,143 on Higher Oil-Freight Claims 23
Inland Waterways Gain Importance in Wartime Oil Movement 26
Salt-Water Injection Sustains East Texas 28
Tennessee Company's 1,228-Mile Line Given FPC Approval 30
Deaths 31
High Severance Tax on Gas Recommended 32

Trends 17
This Week 19
Editorial 25
Refining News 70
Pipe-Line News 74
Natural-Gas News 77

ENGINEERING-OPERATING

Alloys Suited to Resist Sour-Crude Corrosion 33
Bottom-Hole Choke Reduces Gas-Oil Ratio in K.M.A. Wells .. 39
Machine Tests Large Flanged Valves 43
Cracking Technology—No. 4 45
Oil-Well Pumping Practices—No. 14 51
Questions on Technology 56
Oil Zones in the United States—Eocene 56B
Ingenious System Recovers Tank-Generated Vapors 57
The "Little Inch" of the Battle Zones 58
Front Lines in Refining 61

Operating Ideas 49
Cost Engineering 63
Eng. Fundamentals 65
Journalog 67

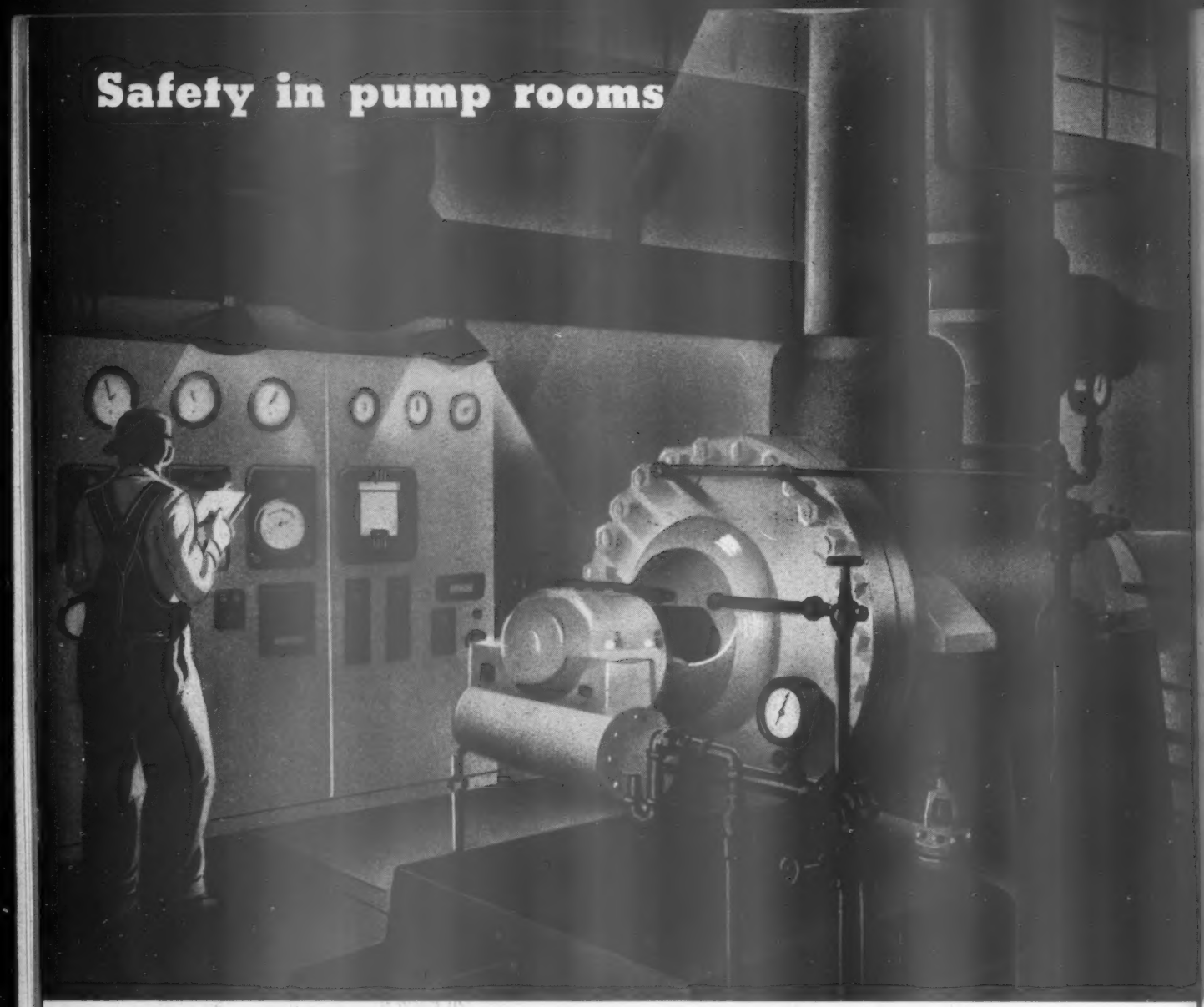
EXPLORATION AND DRILLING

Week's Highlights 79
Completions in All Fields 79
Who Should Mine Coal for Petroleum Synthesis? 80
Daily Average Production for Week 80
Completions Increase in August 81
Wildcat Review 91
Completions by Areas Start on Page 81

ADDITIONAL FEATURES

Drilling Contractors 92
Personals 94
Market Developments 96
Refinery Prices 97
Tank-Wagon Prices 97
Equipment Progress 99
Classified Advertising 101
Calendar of Events 104
Journalisms 104
Advertisers' Index 104

Safety in pump rooms



Information furnished by "Oil and Gas Journal"

Safety in pump rooms consists mainly in preventing contact with moving machine parts, or apparatus operating at elevated temperatures. The following protective measures are suggested:

1. Cover moving belts, gears, flywheels, oiler arms, etc. with heavy screens that are not too readily removable.

2. Cover floor or ground trenches carrying tubing, piping or electric conduits with board or steel plate covers strong enough to withstand the heaviest probable load. These also should require positive action for removal.

3. Sheath type screens of heavy wire screen or latticed rods should cover exposed portions of exhaust or hot water cooling jacket outlet lines. Provision should be made for access to the lines.

4. Screens should be provided in all cases where piston rod or cross head extensions are not covered by the framework of the machine.

5. Motor-pump couplings should be screened to prevent any object falling on them when they are rotating. Screens should be strong enough to protect against all contingencies.

6. Emergency controls, and emergency stops for all machinery should be located at protected points at safe distances from the machines. Location can be either inside or outside the pump room, but it should be readily accessible.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

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Trends

Crude-Oil Production By States — Page 80

CRUDE-OIL STOCKS 233,681,000 bbl. as of Sept. 18—down 708,000 bbl. One year ago 244,294,000.

GASOLINE STOCKS 71,299,000 bbl. as of Sept. 18—down 629,000 bbl. One year ago 79,077,000 bbl.

RESIDUAL FUEL-OIL STOCK 66,893,000 bbl. as of Sept. 18—down 118,000. One year ago 79,722,000.

GAS OIL AND DISTILLATES 40,299,000 bbl. as of Sept. 18—up 898,000 bbl. One year ago 45,133,000.

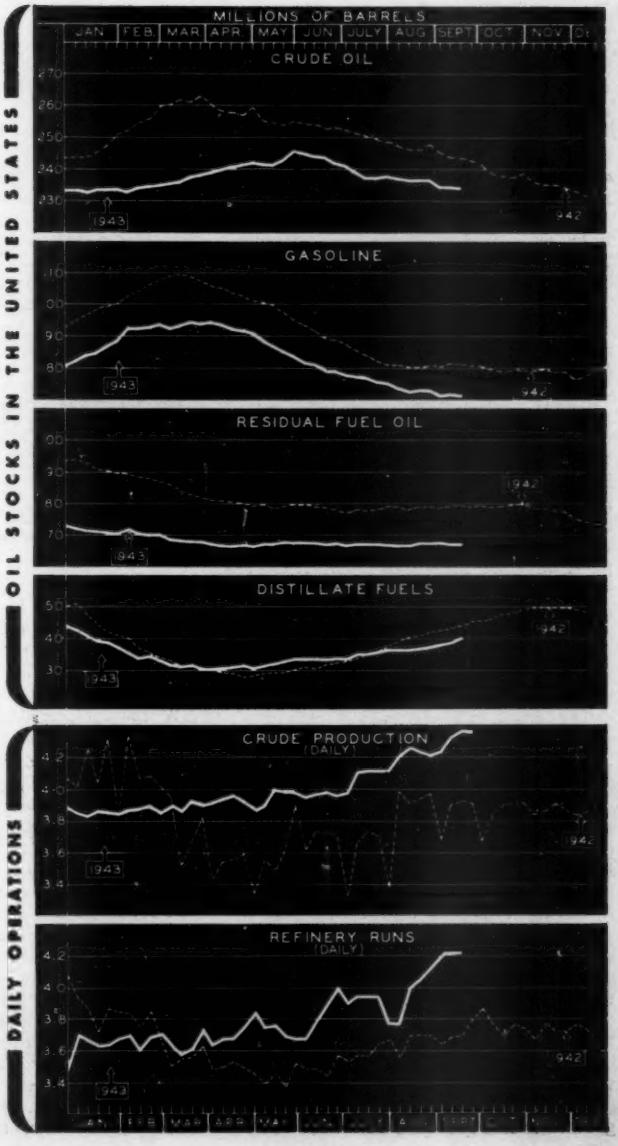
CRUDE PRODUCTION 4,355,795 bbl. daily average—down 12,915 bbl. One year ago 3,916,925 bbl.

REFINERY RUNS 4,209,000 bbl. daily week ended Sept. 18—down 7,000 bbl. One year ago 3,740,000.

THE substantial reduction in tanker freight-rate surcharges instituted last week by the War Shipping Administration indicates two developments of broad significance to the petroleum industry. In the first place, the surcharge reduction shows positively that submarine threats along coastwise and South American shipping lanes are no longer acute. Destruction of tankers by pig boats during early stages of the war snarled normal transportation of petroleum products so tightly that the industry has been nearly 2 years in the installation of alternate facilities. Secondly, the reduction in tanker charges apparently forecasts and gives added confirmation to the reported program for expanding imports from Latin America. Congressmen returning to this country after visits to South America bring back information that Venezuelan production will be doubled to a 1944 average of 1,000,000 bbl. daily.

IT is evident, oil men assert, that major reliance for substantial imports of oil must rest with Venezuela, Colombia, Peru and Mexico. There is no doubt that several thousand barrels of oil daily can be imported from South America, providing the tankers are available.

BUT this partial answer to the acute shortage of crude oil in the United States does not satisfy the rank and file of the industry. Opposition to imports has diminished under the stress of emergency measures. However, the basic cause of inability to meet constantly rising demands over the indefinite future continues to rest, a majority of oil men contend, with the Office of Price Administration. Domestic operators are anxious for a more equitable draft on Allied petroleum reserves for military consumption. They appreciate the dangers of excessive withdrawals from a long-range aspect. There is no desire on the part of the domestic industry to deprive this country of the benefits from an adequate petroleum supply in the postwar period. On the contrary, most operators, including some of the most rabid opponents of foreign imports in normal times, accept the desirability of supplementing domestic supplies with Latin-American oil. Under conditions prevailing since Pearl Harbor, most of the refining facilities qualified to manufacture military-grade gasoline are concentrated in this country. Irrespective of whether foreign crude stays here as such or replaces domestic production sent to the military forces, the over-all supply position would benefit and leave only a technical point for argument.



Rumors of Early Price Decision Either Premature or Unfounded

By Henry D. Ralph

WASHINGTON, D. C.—Rumors of early action to increase the price ceiling on crude petroleum, which ran through oil and financial circles last week, were apparently unfounded or at least premature for the Office of Economic Stabilization has given no indication that it is about ready to make a decision.

Judge Fred M. Vinson, director of OES, is known to be studying the appeal made by Petroleum Administrator Harold L. Ickes following the rejection by the Office of Price Administration of his request for an increase of 35 cents per barrel in the crude ceiling price. The OES has requested various federal agencies to supply it with certain information on petroleum, and is understood to have referred a number of questions on the subject to a group of nongovernment economists. This suggests that while the matter has not been pigeon-holed it may be some time before a decision is reached.

Congressmen Impatient

Members of Congress from oil-producing states are getting increasingly impatient with the delay, and hearings may start soon on several pending bills to require OPA to increase the crude price ceiling. It is not impossible that threat of such legislative action may force the OES to grant some increase in order to forestall a flood of congressional price directives on various commodities which would break down price regulation by executive agencies.

The crude-price situation was discussed at some length in the House last week, and Speaker Sam Rayburn of Texas took the unusual course of engaging in the debate from the floor. During a speech on the subject by Rep. Edward H. Rees of Kansas, Speaker Rayburn declared that production of additional crude from West Texas and other places where there may be some additional capacity will not relieve the strain on other producing wells which threatens to shorten their life and deplete reserves too rapidly.

"What we need is new discoveries," he said, "to keep up the oil reserve we have above the ground. The prospect is that the oil we have in the ground is not going to carry us many years. We need to encourage discovery; we need this injection of a 35-cent increase in the price of oil in order to increase drilling to find new fields and deep fields.

"We have got to find new fields if we are going to have enough oil to serve us. Also, we have got to go deeper in the fields we have discovered, and also we may have to stop at some of the higher levels that are above the level of profitable production. I do not think we are going to have enough oil in this country unless we make new discoveries. With the price of oil static, and the costs of taking the oil out of the ground having gone up from 30 to 40 per cent, the little man is just going to disappear from the field; that is all there is to that.

"I fear seriously that unless some kind of an incentive in the way of an increased price is granted, we are going to find ourselves in this country in 5 years even, not alone 10 or 15 years, very short of the supply of oil that we need."

Higher Costs Cited

The speech of Representative Rees was an extensive review of the oil-production and supply situation, arguing that production must be increased soon to meet military demands and that the only way to accomplish this is to increase the price of crude to stimulate new discoveries and compensate for deeper drilling and increased production costs.

Several other members of the House, including some from states not producing oil, joined in the debate to endorse the demand for a higher crude price to increase production.

Knowlton and Pike Clash Over Benefits of Crude Advance

WASHINGTON, D. C.—The controversy over a crude-oil price increase was thrashed out before a House naval affairs subcommittee September 27 by D. R. Knowlton, PAW production director, and Sumner Pike, OPA fuel-price chief.

The committee demanded copies of PAW request for price increase and OPA reply in detail, both of which have been suppressed, and both officials said that while they were under secrecy orders they would try to furnish the committee with copies. Mr. Knowlton said an appeal is pending before the office of economic stabilization, and "we fully expect OES will give our recommendation thorough consideration and that a decision will be reached on the merits of the case in the near future."

The committee openly favored a price increase and challenged Mr. Pike severely on his reasons for contending an increase is not justified. Mr. Pike said either a price increase or subsidy would increase production and he preferred a price increase, but said the amount of additional production would not be worth the cost to the country and its effect on other prices. He said under the President's hold-the-line order OPA cannot increase crude prices if it will increase living costs, so the only alternative is a subsidy which would not pass on costs to consumers.

Mr. Knowlton estimated 1944 crude production at 1,600,000,000 bbl. and said that during the fourth quarter of 1944 this would fail to meet military and rationed civilian demands by 337,000 bbl. daily. It is planned to meet the deficiency by imports and some curtailment in rationing if production cannot be increased. During the fourth quarter of 1943, the deficiency will be 200,000 bbl. daily, which will be met by imports and with-

(Continued on page 31)

Underground concrete fuel tanks, similar to that shown above, have been recently installed by the Navy in this country and strategic overseas bases. Thiokol synthetic rubber is used like wallpaper to cover all concrete surfaces

REFINING—Need for regular supply items for plant maintenance growing more acute. . . . Refiners fear facilities will collapse, figuratively, unless equipment needs are more effectively recognized, in terms of freer access to materials. . . . Necessity for first-class operating equipment intensified by swing to sour crudes. . . . ¶Lion Oil Refining Co. starts operation of "quickie" butadiene plant, one of a few in original program permitted to be completed. . . . ¶Cities Service Lake Charles, La., refinery, designed specifically for maximum aviation-gasoline production, nearly ready to start full-scale operation. . . .

PRODUCTION—Yield deficit of 200,000 bbl. daily last quarter this year will increase to 337,000 bbl. in fourth quarter of 1944, D. R. Knowlton declares. . . . Unless corrective steps are taken. . . . Industry and nation must meet deficit out of further curtailment of consumption, or imports, probably both. . . . ¶Threatened storm on Gulf Coast choked back last week's production slightly. . . .

TRANSPORTATION—FPC joins WPB in approving Tennessee Gas & Transmission Co.'s 1,228-mile natural-gas line, Driscoll, Tex., to Cornwell, W. Va. . . . More than 1,500 miles of 24-in., 72 miles of 18-in. pipe already ordered. . . . Specifications on gas line to be available in about 2 weeks. . . . Contract may be let before October ends. . . . ¶Twenty-inch products line from Gulf Coast completed to Norris City, Ill. . . . Another 30 days will be needed to complete minor details, test and fill the line, and start deliveries at the Illinois intermediate terminal. . . . Testing work still under way on short stretches on eastern end of WEP 24-in. crude-oil line. . . . ¶Empire Pipeline Co. acquires 65 miles of new 12-in. line connecting Cities Service Refining Corp.'s Lake Charles refinery to Texas-Empire-Tidal trunk system from East Texas. . . . ¶Improved pipe-line transportation diminishes need for inland-waterway barges, hence construction program suffers another reduction. . . . ¶Tanker surcharges materially reduced in coastwise and Caribbean movement, removing one deterrent to higher imports. . . .

SUPPLIES—Maximum of 570,000 bbl. of gasoline daily available for all civilian consumption, including agriculture and preferred-mileage drivers. . . . Bruce K. Brown, assistant deputy PAW, placed military consumption at 600,000 and essential transportation requirements at 450,000 bbl. daily. . . . Thus, irreducible consumption totals 1,050,000 out of aggregate available supply of 1,800,000 bbl. daily. . . . ¶Moderate improvement in East Coast inventories of light fuel oils continues. . . . Eastern stock index stands at 42.5 per cent of normal, up 0.6 per cent. . . . The year ago index was 59.8 per cent. . . .

FOREIGN—Unidentified attache of PAW tells congressional committee that Nazi petroleum supply aggregates 350,000 bbl. daily, including 160,000 bbl. of synthetic products. . . . This explains absence of Nazi planes in long missions over Italy and other parts of Europe, also the Russian retreat. . . . ¶Congressional investigators report 1944 program calls for doubling Venezuela's crude-oil production, to 1,000,000 bbl. daily. . . . Most of increase earmarked for export to this country, along with shipments from Chile and Bolivia. . . .

Acute Position of Crude-Oil Supply Outlined Before Compact Commission

by Neil Williams

SANTA FE, N. M.—The Interstate Oil Compact Commission in its quarterly session here September 24 and 25 again concerned itself primarily with the country's pressing need for more oil production occasioned by the war and with the problems faced by the oil industry in expanding its output from present sources of supply and in finding and developing additional reserves to meet the greatly enlarged demands.

Facts revealing the acuteness of the shortage of oil and the urgency for immediate action to help the oil industry in overcoming the situation were presented. Col. Ernest O. Thompson, member of the Texas Railroad Commission, termed the shortage "grim, very real and critical." The shortage is not an impending one, he said, but one that is here now.

Colonel Thompson pointed to the decline of crude below requirements for working stocks and declared that current consumption must now be met with current production. He said that "it is alarming to note that after every available barrel of oil is produced from the presently known and developed oil fields of America, including the 246,000 bbl. additional that can come from Texas, we will still be 500,000 bbl. per day short of anticipated demands at the peak of the 1944 estimates of crude requirements."

In commenting later on the additional oil which Texas could produce, he said that most of this would be exhausted by increased production within the next 2 or 3 months. He also pointed out that much of the additional capacity of Texas to produce is in West Texas from where there is no additional transportation at present except by tank cars, and that the crude is sour.

Public Land Policy Criticized

Resolutions and practices that will give every possible encouragement to development of oil and gas resources of public domain lands and commending the U. S. Geological Survey for inviting interested parties to attend a conference to be held sometime in October to consider the adoption of rules, regulations and practices concerning oil and gas resources on public land were adopted at the close of the compact meeting.

The resolutions also asked Secretary Harold L. Ickes to broaden the scope of the hearing which now is planned to consider only rules and regulations for unitized operations involving federal lands, to include all rules, regulations and practices of the geological survey relating to oil and gas, whether the lands are unitized or not.

A committee composed of Warwick M. Downing, Denver, Colo., chairman; Hiram M. Dow, Roswell, N. M., and W. T. Holloway of Oklahoma, was appointed to follow through on the resolutions. Adoption of the resolutions resulted from an open meeting called by Gov. John J. Dempsey of New Mexico for representatives of public-lands states, attending the compact meeting, to discuss the proposed new rules and regulations governing unitization projects involving federal land. Strong opposition was voiced to the proposed new rules and regulations which would place the control over all unitized projects involving federal land in the hands of the U.S.G.S. Particularly objectionable were those rules which will prohibit any operator in such unitized project from creating an overriding royalty over 5 per cent and requiring that any oil payment must have the approval of the federal Government.

Those at the meeting were of the opinion that the control should remain in the hands of the operators involved and the state regulatory bodies. It was pointed out that the federal government in effect is only a royalty owner, and as such should not dictate how the operations should be carried on. Federal control over such projects, and the provisions of the proposed rules and regulations, it was stated, would discourage unitization involving federal land and also development of such lands. Practices of the Geological Survey pertaining to nonunitized federal leases also were condemned as discouraging development.

John M. Kelly, executive director of the New Mexico Oil Conservation Commission, reported that bottom-hole pressure in the Hobbs field has declined only 20 lb. in the past 5 years, as confirmation of his report that the pool's operation is in sound engineering balance. Gas-oil ratios,

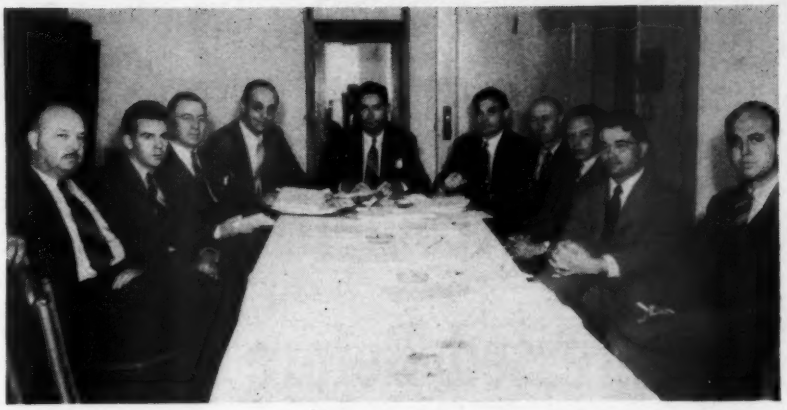
Speakers before the Interstate Oil Compact Commission meeting: Dr. Eugene A. Stephenson, professor of petroleum engineering, University of Kansas; B. L. Majewski, vice president, Deep Rock Oil Corp. and chairman PIWC marketing committee; E. E. Pyles, chairman of the production committee, PAW District 5, and coordinator for the California Oil Producers Association, Los Angeles, Calif.; John M. Kelly, executive director, New Mexico oil commission, Santa Fe, and Col. Ernest O. Thompson, Texas Railroad commissioner

he said, are constant between 1,100 and 1,200 cu. ft. per barrel. Approximately 86 per cent of the current production is by natural pressure after 15 years of operation. Approximately one well per year is going on the pump.

The commission's research and coordinating committee, headed by Dan O. Howard, Oklahoma Corporation Commission geologist, decided to make a study of dual-completion practices in the member states. The committee is cooperating with the U. S. Bureau of Mines in collecting oil samples from pools in the compact states, and was advised at the Santa Fe meeting that larger samples will be obtained for the purpose of analyzing various crudes as possible sources of marginal aviation base stock.

The committee has completed a preliminary report on underground storage of natural gas. After some revisions and additions, the report will be made available to the industry.

Additional subjects, such as the taking of back-pressure tests on high-pressure distillate wells, will be incorporated in the committee's project for applying uniform engineering definitions and standardized techniques to the regulatory statutes.



Research and Coordinating Committee (Technical Group) of the Interstate Oil Compact Commission in session at Santa Fe, N. M. Around the table are: Alec M. Crowell, director, Arkansas Oil and Gas Commission, El Dorado, Ark.; John M. Kelly, state geologist and executive director, New Mexico Oil Conservation Commission, Santa Fe; Samuel F. Peterson, petroleum engineer, Department of Mines and Minerals, Springfield, Ill.; E. G. Dahlgren, technical secretary of the commission, Oklahoma City, Okla.; Dan O. Howard, petroleum geologist, Oklahoma Corporation Commission, chairman; J. Burdette Wilson, assistant technical secretary of the commission, Oklahoma City; F. M. Van Tuyl, professor of geology, Colorado School of Mines, Boulder; Jack K. Baumel, director of production, Texas Railroad Commission, Austin; L. B. Taylor, petroleum engineer, Department of Conservation, Wichita, Kans., and Dr. J. Huner, Jr., state geologist, Baton Rouge, La., representing Harry W. Bell, director of minerals, Louisiana Department of Conservation

Faith Expressed by Pyle in California Petroleum Reserves

FAITH in the ability of California to support its burden of higher rates of crude-oil production was expressed before the Interstate Oil Compact Commission meeting last week in Santa Fe, N. M., by E. E. Pyles, chairman of the PAW District 5 production committee. He reported that the current production rate of more than 775,000 bbl. daily will be increased to above 800,000 bbl. a day by April 1, 1944.

"There is the whole north half of the San Joaquin Valley and the Sacramento Valley that are known to have gas producing horizons and may some day yield oil," he said, in discussing the possibilities for discovering new fields. "The Salinas basin," he went on, "has petroleum-bearing formations in it and may some day become a potential territory. Likewise, the Imperial Valley has not been entirely eliminated as potential oil territory. There are pretty definitely also large offshore deposits that cannot now be developed because of statutory regulations preventing drilling."

Mr. Pyle holds the opinion that material increases in California's pro-

(Continued on page 32)

Majewski Warns of Sharper Rationing

A DEEPER ration cut can be expected before next July, Mr. Majewski told the commission and approximately 150 observers, unless the thinking and attitude of OPA is changed.

"The inevitable result of this short-sighted discriminatory price policy in petroleum by a cycle of price administrators and their staffs has resulted in deeper rationing of gasoline east of the Rockies and threatens to seriously impair the transportation system of the Middle West and Southwest," he declared.

Mr. Majewski warned that gasoline conservation is the only answer to the dwindling supply and serious shortage of crude oil. He outlined plans of the PAW District 2 general industry committee to compile and disseminate periodically pertinent statistical data on crude-oil producibility, aboveground stocks, runs to still, refinery yields and the supply, demand and stock position of all major products.

"Unless gasoline consumption is checked at once," he declared, "oil stocks must fall below the level so necessary to keep an unrestricted flow to our fighting men."

"A continuation of such subterfuge action, "Mr. Majewski said, referring to OPA's sporadic price adjustments and plans to subsidize high-cost production, "without commensurate increases in product price ceilings will merely hasten the day when the industry will become a government controlled monopoly, and means the elimination of the independent oil refiner.

"Congress must break the existing log jam at its earliest opportunity. If this Interstate Oil Compact Commission and the governors of the states east of the Rockies press upon Congress the urgency and need for prompt remedial action, I venture the opinion that by October 1, 1944, there will be no need to ration petroleum products east of the Rockies."

Mr. Majewski plead with the commission and the governors and people of the states east of the Rocky Mountains to "help the oil industry and the several governmental agencies involved to maintain an unrestricted flow of gasoline and other petroleum products to our fighting forces wherever they may be, on time and in more than enough quantity for winning the earliest possible victory on all fronts.

Further explaining the reasons for civilian curtailment of gasoline consumption, Mr. Majewski told of the enormous military requirements for petroleum products, stating that the demand for crude oil for raw material in the manufacture of these products had far exceeded production for more than 18 months and that stocks aboveground are dwindling to the point that early in 1944 they will approach the danger level. Not only is crude-oil productive capacity falling off rapidly with the decline in discovery of new fields and sources of supply, he said, but also gasoline production is continuing to decline.

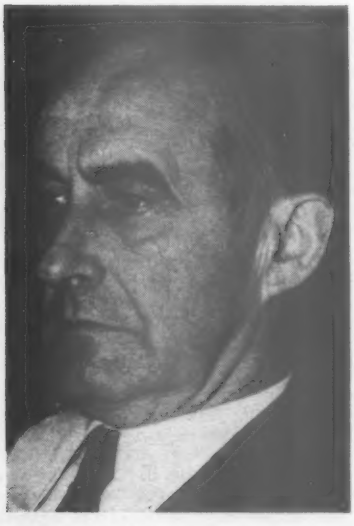
Pride in Industry's War Accomplishments Expressed Before N.P.A.

by J. P. O'Donnell

NEW YORK.—Pride in the oil industry's success in meeting both the military and essential civilian requirements of the United Nations and confidence that it would continue to do so for the duration were voiced in addresses delivered at the forty-first annual meeting of the National Petroleum Association. The two-day meeting was held here last week for the first time because of inability to obtain accommodations at Atlantic City.

Both pride and confidence were expressed by Dr. Gustav Egloff in his talk on refining processes. The research director of the Universal Oil Products Co. applied Churchill's tribute to the RAF, "never . . . was so much owed by so many to so few," to the chemists and engineers of the American oil industry who provided the fuel which gave the RAF its margin of superiority in the Battle of Britain. Later he declared that the industry has met every demand and, under the free enterprise system, "should continue to supply the products our industrial and social system needs."

Only 750,000 bbl. of this country's daily motor-fuel production is available for industrial, agricultural and civilian consumption. This was concluded before the N.P.A. annual meeting in an analysis by Bruce K. Brown, assistant deputy petroleum administrator. Military consumption and essential transportation require an aggregate of 1,050,000 bbl. daily. The paper by Joseph E. Pogue on a balanced world-petroleum program, among those presented at the N.P.A. meeting, started on page 84 of the September 23 Journal.



Harry A. Logan, vice president of United Refining Co., Warren, Pa., was reelected president of the N.P.A.

Dr. Egloff reviewed the better-known processes contributing to the war effort and mentioned the role that each played in supplying aviation gasoline ingredients, toluene and material for synthetic rubber. These have given the chemist hydrocarbons nature never produced. He cited normal pentane, with an octane number of 64, which can be isomerized into one of the most important aviation-gasoline hydrocarbons. He also mentioned the recently announced process for the manufacture of triptane, which has a 50 per cent greater power output than 100-octane.

Catalytic cracking was the only war-developed or war-accelerated process that Dr. Egloff saw as certain to remain after the war. This view was based on the fact that it is a conservative force through its ability to increase the gasoline quality and yield. Refinery gasoline prices of 6, 7 or 8 cents a gallon will not carry the load, he said, and he hinged the survival of new processes on economics. He definitely predicted the end of the motor method of gasoline testing since road tests are the only real basis of evaluation.

Brown Analyzes Gasoline Supply

The public's lack of appreciation for the many essential needs for gasoline was blamed for its dissatisfaction with the petroleum policy by Bruce K. Brown, PAW director of refining. After quoting figures showing that present availability of petroleum products, 64 per cent of normal, compared favorably with many food products, Mr. Brown questioned the validity of public criticism of the oil shortages. He attributed some part of the criticism to declining state tax revenues and to the fact that gasoline consumers, through organizations, are vocal.

Military demands this month required 32 per cent of all refined petroleum products and this figure shortly will rise to 40 per cent, Mr. Brown said. He briefly analyzed the gasoline situation by pointing out that out of a current production of 1,800,000 bbl. per day, 600,000 bbl. are required by the military and 450,000 bbl. for essential transportation, which leaves only 750,000 bbl. per day for industrial use, farm consumption and civilian passenger cars.

District 1 problems were analyzed by H. W. Dodge, PAW director in charge, from the standpoints of production, refining, transportation and marketing. Declining volume and reduction in stocks are the principal production problems and their best solution, Mr. Dodge said, is an increase in price represented by the

H. W. Dodge, director in charge of PAW District 1, blamed inadequate prices for ills of the eastern petroleum industry

producers as not less than $1 per barrel. Crude supply is the first refining problem. District 1 refineries have a capacity of 825,000 bbl. per day, which in the first 6 months of 1943, was operated at only 65 per cent of capacity. In the first 2 weeks of September, runs averaged 740,000 bbl. daily, up more than 187,000 bbl. from the first half average. The second problem associated with refining is the distribution of products.

District 1's transportation problem will be completely solved by the completion of facilities now under construction, Mr. Dodge said. He added that the corollary matter of supply is now the real problem. He said that no functional division had suffered more than marketing, hit from the standpoints of manpower, conversion and supply and distribution.

J. B. Fisher, executive vice president, Kendall Refining Co., called for protection of the independent in the postwar era because of his importance to the industry. He pointed to the monopoly suit against the A.P.I. major companies and their subsidiaries, suspended for the duration. He indicated that the existence of the independent was the best defense against this charge.

Postwar Suggestions

As an independent refiner, Mr. Fisher asked the industry to conduct itself along sound constructive lines with room for the independents in the postwar era. He suggested tha the suspended credit-card system, which at one time cost an average of .85 cent per gallon, be allowed to die and that major companies cease exclusive dealer practices which have deprived independents of outlets.

Harry A. Logan, United Refining Co., president of the association, said the industry has survived 3 wars and will survive this one. He saw a parallel between 1918 and the present and, while he did not predict an early end to the war in Europe, urged that real effort be devoted to preparing for the postwar era. Mr. Logan looked for a "sellers' market" after the war which is always accompanied by progress. In comparing World Wars 1 and 2, he referred to the speedy dissolution of federal agencies after the first and hoped that similar action would be taken again.

Other general session talks were made by Lt. Col. Keith L. Morgan, U.S.A., who cited instances of the large consumption of oil products by the armed forces in the Tunisian and Sicilian campaigns, and Dr. Alfred P. Haake, who called denial of the workers' right to produce as much as they could the root of the manpower problem and said that declining faith in our established institutions, such as free enterprise, was the major cause of domestic troubles.

A. O. Willey, speaking before the department of manufacture on the evaluation of base oils for heavy duty service, said that the type of crude oil was no indication of the suitability of the stock for such products and showed test data to support his statement. He said that specification data as now used are inadequate for evaluating oils and that they must be replaced with service tests. Oils meeting such tests as those prescribed by the ordnance department are doing the job. He concluded with the statement that neither the source of an oil, the method of refining nor the additive alone was sufficient in itself for a satisfactory heavy-duty lubricant.

R. W. Schields, associate director, pipe-line section, and S. F. Niness, associate director, tank-truck section, division of petroleum and other liquid transport, ODT, spoke before the department of traffic and transportation. Mr. Schields said that new construction has increased deliveries to the East Coast by pipe lines from 41,000 bbl. daily before 1941 to 350,000 bbl. and it will eventually reach 600,000 bbl. a day. Mr. Niness found manpower the most serious problem in the tank-truck field and urged the industry to take steps to combat further losses.

Paul R. Beck, president of the Pennsylvania Refining Co., Butler, Pa., was added to the association board of trustees. Other members of the board and officers of the association were reelected.

DSC Pays $253,912,143 on Higher Oil-Freight Claims

WASHINGTON, D. C.—Claims for compensation for rail shipment of petroleum into the eastern district submitted by oil shippers to the Defense Supplies Corp. amounted to $253,912,143 on September 21, according to George Hill, Jr., vice president of DSC.

Testifying before a subcommittee of the Senate committee on agriculture, Mr. Hill said that this does not represent the total claims, since many companies are from 1 to 2 months late in submitting statements of transportation charges incurred in excess of what the normal tanker cost would be. Since DSC started the tank-car compensation plan in August 1942, it has paid claims totaling $206,383,000, and has received $109,000,000 from the trustees of the tank-car pool fund. He estimated that the net loss of the compensation fund would be about $100,000,000 for 1943, and between $40,000,000 and $50,000,000 during 1944, at a declining rate since use of the 20 and 24-in. pipe lines would decrease rail movements and lower the differential between overland and ocean transportation costs.

The subcommittee is investigating the availability of gasoline to farmers in the eastern district, and had before it a complaint from a New York State operative, that it was unable to obtain compensation for freight charges from DSC without also making contributions to the tank-car pool. Further hearings on this subject will be held later.

The subcommittee, headed by Sen. George D. Aiken of Vermont, is also investigating complaints from farm cooperatives and others that military preferences and the District 1 zone and quota system prevent farmers from obtaining sufficient gasoline for agricultural purposes. Under Directive 59 of the Petroleum Administration for War, primary suppliers in the East Coast region have their business limited by quotas based on 1941 operations, and charges have been made that this prevents proper distribution of available gasoline to regions where agricultural activity has increased and also prevents cooperatives from obtaining new sources of supply.

War Department Needs Maps on Foreign Countries

Army Map Service, Corps of Engineers, U.S.A., is searching for large-scale maps, guide books, gazetteers, postal guides and place lexicons of any area outside of continental limits of the United States.

Topographic maps on a scale of 1:1,000,000 (16 miles to 1 inch) or larger and city plans of a scale not smaller than 1:25,000 (2½ in. to 1 mile) are of particular interest.

Donors may be privileged to make a direct contribution to the war undertaking if willing to present them to the War Department.

It is important to take account of what is NOT WANTED: This includes maps issued by the United States Government, National Geographic Society, domestic maps and small-scale maps.

Franked labels will be sent so that material can be forwarded without expense of postage. Data can be submitted to, or further information obtained from: New Orleans Library Branch, Army Map Service, 900-A Maratime Bldg., New Orleans, 12, La.

Pipe-Salvaging Program On Pacific Coast Wins Commendation of PAW

WASHINGTON, D. C.—Petroleum Administrator for War Harold L. Ickes this week commended West Coast oil producers for saving thousands of feet of steel casing by reclaiming operations.

Total recovery of steel casing by Pacific Coast operators is currently at the rate of about 75,000 ft. a month.

"It is gratifying to report," Administrator Ickes said, "that, as a result of the cooperation of oil producers on the Pacific Coast, thousands of feet of valuable steel casing have been reclaimed, largely from producing wells where overlapping strings of pipe were located, without jeopardizing the production of the wells.

"In District 5 (Pacific Coast), at least 1,000,000 ft. of casing have already been reclaimed, and the total is mounting each month. This means that the oil producers are able to continue important drilling operations despite shortages of new materials and equipment."

Deputy Administrator Ralph K. Davies cited outstanding examples of the quantity of casing being reclaimed on the West Coast. The companies, number of feet of casing already reclaimed and the current monthly rate of reclamation follows:

Standard Oil Co. of California, 185,000 ft. reclaimed, current rate 17,000 ft. a month; Shell Oil Co., Inc., 126,000 ft. reclaimed, 21,000 ft. a month; Texas Co., 50,000 ft. reclaimed, 8,500 ft. a month; General Petroleum Corp., 75,000 ft. reclaimed, 12,000 ft. a month; C.C.M.O. Co., 7,000 ft. a month, and Union Oil Co., 7,000 ft. reclaimed, current rate of 2,500 ft. a month.

Illinois' Oil-Tax Act Held Constitutional

SPRINGFIELD, Ill.—With millions of dollars in state revenue at stake, Circuit Judge L. E. Stone last week held that Illinois' 3 per cent oil-production tax is constitutional in the first court test. The act became effective July 1, 1941.

Attorneys said the test case would be appealed immediately to the state Supreme Court.

Under the act, a tax of 3 per cent is imposed on the value of all oil produced in the state. In the 2 years that the act has been operative, $8,398,661.41 has been paid under protest and the money is now being held in the state escrow fund.

Oil firms challenging the act's validity argued that only the actual operator or manager of a well is engaged in producing oil, and that it was unconstitutional to impose the tax burden on persons having a royalty or other interest in the oil at the time it is taken from the earth.

Refinery Instruments Described in Lecture

W. W. Tomes, head of the flowmeter division, Cochrane Corp., Philadelphia, presented a 2-hour illustrated discussion of refinery instruments in Tulsa, September 24, under the auspices of Refinery Supply Co. of Tulsa.

More than 50 instrument and other refinery technical men attended the lecture. The talk was illustrated with photographs and slides of the principal working parts of flow meters, with technical discussion of each point in turn. The lecture was designed to give instrument men a better knowledge of flow meters, their design, construction, operation and maintenance.

Tubular Restrictions Eased in Illinois

WASHINGTON, D. C.—Operators drilling wells subject to Supplementary Order 5 to PAO 11 in Illinois and parts of Indiana and Kentucky were authorized last week to use priorities assistance in obtaining casing and tubing. Formerly such wells could be drilled only if casing and tubing were from stocks on hand or were acquired without the use of priorities assistance. Priorities assistance has always been permissible for obtaining materials other than casing and tubing and this provision is unchanged.

The amended order also eliminates the necessity of filing certain completion reports which were previously required on wells drilled pursuant to the order.

Supplementary Order 5 to PAO 11 has replaced the provisions of the former War Production Board M-68-5, but many operators in the affected area still refer to it as M-68-5.

Iraq Superintendent to Revitalize Operations

A. F. Driscoll, superintendent of Iraq Petroleum Corp., has been recalled to Iraq for the purpose of expanding production from the Kirkuk field. Many operations, it is reported in this country, were suspended in Iraq when the threat of German invasion from the north was at its height, and during the time that Allies lacked control over Mediterranean shipping routes. Greater allied use of Near East oil is planned.

Texas Mid-Continent Arranges Discussion Of Wage Regulations

FORT WORTH, Tex.—Wages and salaries in the Texas oil industry will be discussed in open forum at the Texas Mid-Continent Oil and Gas Association's twenty-fourth annual convention, to be held here October 13 and 14, by A. H. Hertwig and Floyd McGown, of the Salary Stabilization Unit, U. S. Treasury Department, and the National War Labor Board, respectively.

Mr. Hartwig is head of the regional office of the Salary Stabilization Unit, U. S. Treasury Department, at Dallas, Tex., while Floyd McGown is chairman of the Eighth Regional War Labor Board, also of Dallas. It is planned to have these men conduct an open forum on salaries and wages in the Texas petroleum industry and to answer questions of oil men concerning their own particular problems in this connection.

Convention committee announced that the program is about completed. The speaker lineup already includes Eric Johnston, president of the U. S. Chamber of Commerce; Gov. Coke Stevenson; George Sawtelle, president of the association; Wirt Franklin, assistant deputy petroleum administrator, and John D. Gill, chairman of the committee on cost and price adjustment to the Petroleum Industry War Council.

The business sessions will be confined to the first day of the meeting, October 13, but many who have already sent in reservations plan to stay over for the annual oil men's golf tournament, which will be held at the Colonial Country Club, October 14.

East Toliver Field Given Definite Spacing Rules

Specific limits for the East Toliver field in Clay County, Illinois, were established last week by Administrative Letter 11 issued by PAW District 2 at Chicago. The letter also specified center of the northeast quarter of respective quarter-quarter sections as the uniform spacing pattern.

The south halves of Sections 24, 25 and 36-5n-6e, were included in boundaries of the field and all other sections or parts of sections in the township were excluded. The south halves of Sections 19 and 29 and all of 30, 31 and 32-5n-7e, and all other sections or parts of sections in Township 7e, are excluded from the field by definition. The regulation makes customary provision for appeal by operator unduly harmed.

FOUNDED IN 1910

BY PATRICK C. BOYLE

the OIL AND GAS JOURNAL

Refinery Red Light

RECENTLY completed studies reveal that unless immediate action is taken the lack of refinery capacity will serve as a stop in the further expansion of product output in this country. These investigations show that the manufacturing divisions of the petroleum industry have not been given the consideration that they should have in the development of the war program.

So far as the Government is concerned, its interest in petroleum refining has been largely confined to those matters pertaining directly to the manufacture of war products. When the full story of these specialized and largely new activities can be told it will unfold the outstanding manufacturing accomplishment of the war period.

Many have assumed that the production of war products represents capacity added to the prewar operations. Actually, excepting a few instances, this is not the case and most refiners are doing their part in the war-production schedules without adding to their over-all capacities. The war output, as one operator has explained, has come "from the heart of normal refinery operation."

What this has meant is apparent from a study of refinery yields. Contrary to a recently publicized statement, additional motor fuel is not available as a byproduct of the greatly enlarged aviation-gasoline output. Rather, the production of motor gasoline decreases as the aviation fuels expand, the decline amounting to more than 40 per cent in a representative refinery group in which aviation-gasoline production has become a major phase of plant operations. Octane ratings of the civilian gasoline stocks have been lowered.

Furthermore, gas losses with the greater emphasis on cracking have greatly increased, thus reducing the quantity of merchantable products obtained from a barrel of crude oil. The need for the largest possible yield of the best quality diesel fuels is a factor in many operations.

Numerous plants are now being asked not only to maintain the largest possible yields of military and civilian gasolines but also to increase their recovery of overhead distillates. A short time ago enlarged outputs of residual fuel oils were wanted in these same areas.

Add to this the introduction or the increased use of sour crudes at many refineries and you have some conception of the difficulties with which plant operators have been confronted.

So far as output is concerned most plants are operating at capacity. Forcing additional crude oil to the stills of these plants reduces efficiency and adds to the output of the products for which there is the least demand. There are a few idle plants but generally they do not have the facilities to carry on operations required at this time. Crude-oil supplies could only be made available by taking them away from plants which are operating satisfactorily now.

The solution to this problem is to make available to refiners the equipment and manpower required to round out all divisions of their plant operations. This includes the rehabilitation and the proper maintenance of existing facilities. This cannot be done in a few weeks.

It is nonsense and worse to talk about further expansion in the 1944 output of plant products until plans are made effective to end this manufacturing bottleneck.

Inland Waterways Gain Importance in Wartime Movement of Petroleum

by Henry D. Ralph

WASHINGTON, D. C.—The nation's inland waterways are playing an important part in the wartime movement of petroleum and its products.

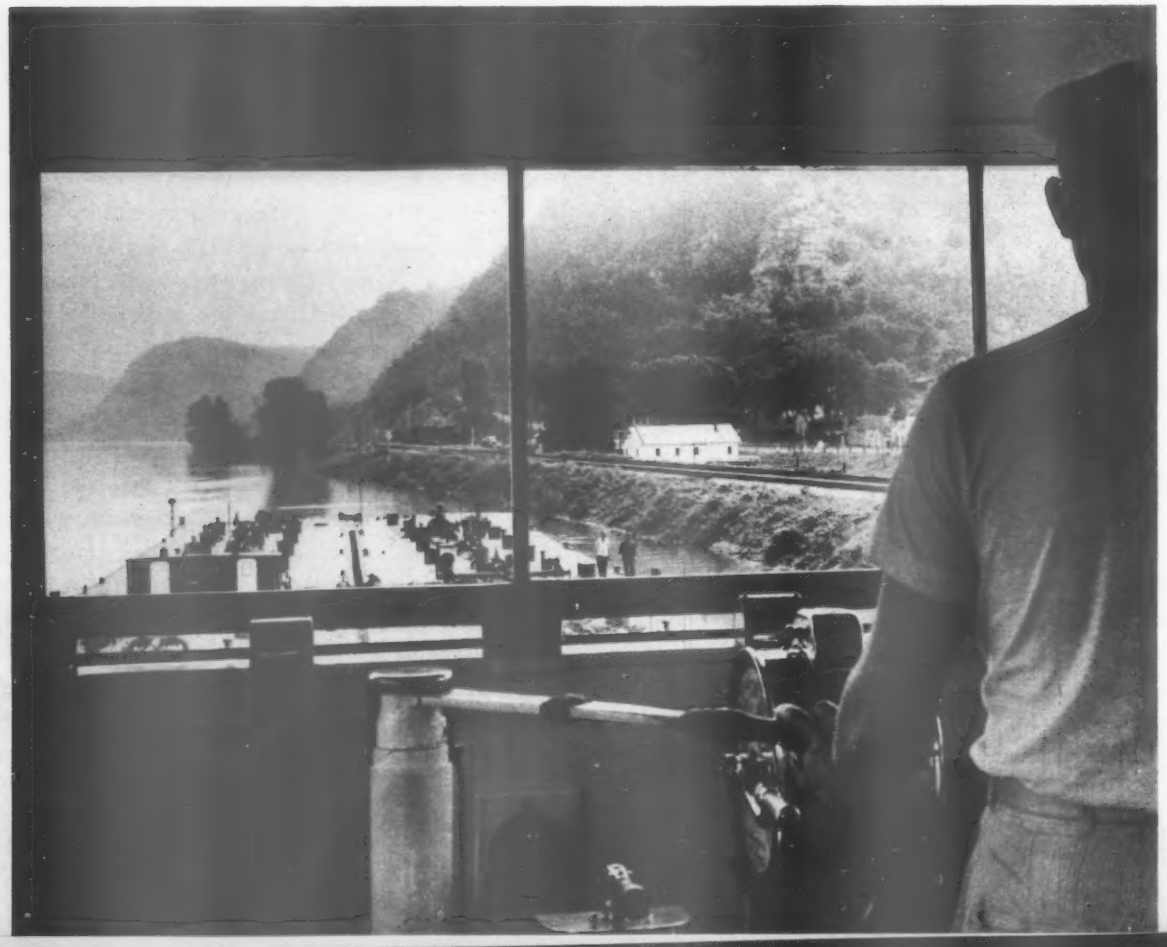
Rivers and coastal canals always have moved substantial volumes of petroleum, but much of this was either for local distribution or for markets not completely served by pipe line or ocean tanker. When the ocean tankers went to war, and the railroads were given the enormous burden of moving every barrel of oil they could load, attention immediately turned to our long stretches of inland waterways.

The Mississippi River system and its tributaries, with the Ohio River navigable to Pittsburgh and the Illinois River connected to Chicago and the Great Lakes with a canal, provides a natural artery most of the way from the oil-producing areas of the Southwest to the heavy consuming areas of the Northeast. This is supplemented by two other important waterways, the Great Lakes, and the intercoastal canals from Texas to Florida along the Gulf of Mexico and from Florida along the Atlantic Coast to New Jersey with the two now connected by an oil pipe line.

Inland waterways no longer are the ugly duckling of the petroleum transportation system. Wartime exigencies have elevated barge traffic from historic tranquility to a vital link in the oil-supply picture.

Though long, winding, and indirect, these waterways are capable of handling large volumes of traffic, but the limiting factor was found to be "rolling stock." There were not enough barges and tugs and towboats to increase the movement of oil much above prewar levels, and the materials and fabricating shop facilities could not be spared for an immediate and large expansion of these vessels. For months both congressional committees and various executive departments of the Government struggled with the problem, considering suggestions for wooden barges, conversion of dry-cargo barges to oil service, concrete vessels, and wooden barges lined with canvass or rubber cells. At present, however, there is well under way a substantial program for the construction of new barges and motive power, both of

Heading into dock at one of the hundreds of terminals supplied exclusively by barges operating on the inland waterway system



wood and steel construction materials.

The movement of oil on the inland waterways is highly important. During June 1943, to pick a typical recent month, a total of 27,931,758 bbl. of petroleum and oil products were moved between ports on the seven principal sections of the inland waterways of the eastern part of the country which are of greatest importance in oil shipments. Not all of this oil moved north and east, as the figure includes some local distribution in the reverse direction, but more than 90 per cent of the total is from oil-producing areas toward the eastern shortage region.

Table 1 shows the port-to-port oil movements on these seven waterways during June, the first column being deliveries into ports on the waterway and the second showing shipment out of ports via the waterway.

TABLE 1—PORT-TO-PORT MOVEMENT IN JUNE
(Figures in barrels)

Gulf Intracoastal Waterway	3,683,212	7,543,192
Atlantic Intracoastal Waterway	2,803,905	2,800,577
Lower Mississippi River	6,522,412	6,345,289
Upper Mississippi and Illinois rivers	1,434,094	1,572,053
Ohio River and tributaries	4,960,505	1,850,098
Hudson River and New York State Barge Canal	1,448,809	468,179
Great Lakes	7,078,821	7,352,370
Total	27,931,758	27,931,758

To this figure may be added 11,020,179 bbl. of oil moved within ports on these waterways to show a grand total for June of 38,951,937 bbl. The overwhelming bulk of this movement within ports was on the Atlantic Intracoastal Waterway, presumably chiefly literage, bunkering and local distribution in such areas as the Chesapeake Bay region and New York Harbor and Long Island Sound.

In terms of barrel-mile movements, the achievements of the inland waterways is even more impressive.

TABLE 2—BARREL-MILE MOVEMENTS OF OIL BY WATERWAYS, JUNE 1943

Atlantic Intracoastal	721,647,384
Great Lakes	2,607,537,727
Gulf Intracoastal	2,445,298,564
Hudson River	78,886,147
Lower Mississippi and tributaries	2,470,636,617
New York State Barge Canal	311,417,840
Ohio River and tributaries	1,776,639,337
Upper Mississippi and Illinois River	948,595,556
Total	11,360,659,772

Of this total of 10½ billion barrel-miles in 1 month, 94.3 per cent was movement north and east, 2.9 per cent south and west, and 2.8 per cent movements within ports.

Directives of the Petroleum Administration for War and the Office of Defense Transportation keep movements south and west to a minimum, and such shipments as are permitted are considered essential for local distribution or to serve certain refining or marketing areas. The chief emphasis of these agencies is to move more oil north and east, and while only a small percentage of the waterborne oil actually is delivered by waterway into District 1, the waterways feed pipe lines and tank-car terminals which continue the northeastward movement, so the waterways are being used as an essential and integral part of the oil-transportation system which is replacing the service formerly performed by ocean tankers.

Actual deliveries to the Atlantic seaboard states are not, in themselves, a highly important factor, even though this is the ultimate destination of most of the oil—or of oil which goes north and east by other means and is replaced locally by supplies via inland waterways. For instance, it has been found much more important to barge oil up the Ohio River as far as Cincinnati, Ohio, and there transship via tank cars to New England than it would be to continue the barge movement all the way to Pittsburgh, Pa. This is because of the relative difference in "turn around" time of barges and tank cars. This movement, however, is more efficient than using tank cars all the way from Texas or Louisiana to the Atlantic Coast, and thus the barge movements are integrated with rail and pipe-line facilities.

Table 3 shows the average barrels of petroleum moved per day over all inland waterways which contribute to the through movement of oil during the first 6 months of this year, the percentage delivered into District 1 from Districts 2 and 3, the other northward and eastward movements,

(Continued on page 72)

Salt-water gathering lines crossing a low area where it was necessary to support pipe on a trestle. Asbestos cement pipe is used

Salt-Water Injection Sustains East Texas

Expanding Requirements for Sweet Crude Oil Place Greater Emphasis on Prolonging the Production of This Key Supply

by W. S. Morris*

THE demand for more sweet oil for the war effort has required the production of more crude from the East Texas reservoir in recent months. The number of producing days increased from 20 in June, 1943, to 23 in July, August, September and October. The increase in the amount of oil taken from the field added to the increase in salt-water production has resulted in a daily average withdrawal rate from the reservoir approximating the maximum amount that should be taken from the field and still maintain the reservoir pressure.

Pressure Maintenance

Farsighted operators realized during the latter part of 1941 that the salt-water production in the East Texas field would have to be returned to the reservoir if the pressure in the oil sand was to be maintained at a point where natural flow would continue. It was realized at that time that the volume of salt water being produced in the field would increase and that unless the rate of withdrawals was reduced or more salt water returned to the sand the reservoir pressure would decline to such a point that pumping would be required.

To make it possible to return large

*Vice president and general manager, East Texas Salt Water Disposal Co.

TABLE 1—SALT WATER INJECTED BY EAST TEXAS SALT WATER DISPOSAL CO.

	Disposal facilities furnished			Water injection (bbl.)	
1942—	Leases	Wells	Injection systems	Month	Dly. av.
October	4	29	1	91,670	2,957
November	11	80	2	172,942	5,765
December	27	208	8	323,995	10,451
1943—					
January	64	442	16	710,235	22,911
February	117	734	17	1,260,214	42,007
March	139	897	20	1,743,650	56,247
April	236	1,360	24	2,383,047	79,435
May	266	1,502	25	2,929,503	94,500
June	270	1,543	25	3,149,998	105,000
July	290	1,644	24	3,640,251	117,427
August	311	1,781	25	3,845,285	124,041
Total (11-month period)				20,250,790	60,450

TABLE 2—TOTAL FLUID WITHDRAWAL AND RESERVOIR PRESSURE EAST TEXAS FIELD

	Daily average production (bbl.)				Water injected per day	Net fluid withdrawal per day	Reservoir pressure first of month
1942—	Oil (tanks)	Oil (reservoir)	Salt water	Total fluid	(bbl.)	(bbl.)	(lb. per sq. in.)
October	365,075	462,120	364,728	826,848	87,007	739,841	1,020.71
November	356,722	451,546	353,379	804,925	88,932	715,993	1,016.24
December	360,105	455,829	351,438	807,267	95,319	711,948	1,017.12
1943—							
January	324,961	411,343	340,839	752,182	102,059	650,123	1,015.71
February	324,627	410,920	340,524	751,444	124,754	626,690	1,020.55
March	325,753	412,345	341,119	753,464	137,064	616,400	1,016.14
April	354,051	448,166	351,721	799,887	160,828	639,059	1,020.44
May	342,759	433,872	342,060	775,932	176,727	599,205	1,019.16
June	334,725	423,702	338,928	762,630	190,992	571,638	1,016.21
July	373,744	473,094	356,414	829,508	208,555	620,953	1,016.98
August	374,189	473,657	358,003	831,660	215,041	616,619	1,012.22
September	.....	.....	.....	.....	.....	.....	1,008.46
1943	83,736,435	105,995,480	84,145,537	190,141,017	40,068,567	150,072,450	7.25
Daily	344,594	436,195	346,278	782,473	164,891	617,582	

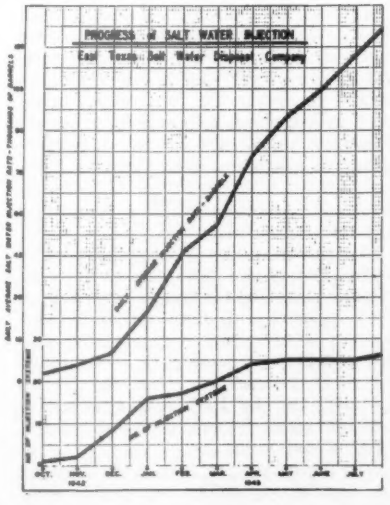
quantities of salt water to the Woodbine sand the East Texas Salt Water Disposal Co., a 2 million dollar Texas corporation, was organized in 1942. The company's first disposal well was put into operation during October 1942 and since that time the activity of the concern has steadily increased as indicated in Table 1, and as shown in the accompanying graph. From these data it can be seen that in addition to the volume of water injected by various oil companies owning their own systems, the salt-water company has installed facilities to the extent that during August 1943 over 124,000 bbl. per day of salt water were returned to the sand and during September 1943 the volume was approximately 140,000 bbl. per day.

Results of Water Injection

The result of returning large volumes of salt water to the Woodbine sand has had a beneficial effect on the reservoir pressure as shown in Table 2. During the first 8 months of 1943 the East Texas field produced a total of 83,736,435 bbl. of oil for a calendar day average of 344,594 bbl. During that same period of time, more than 84 million barrels of salt water were produced, approximately half of which was returned to the reservoir. After deducting the volume of water injected, the net fluid withdrawal for the first 8 months of 1943 averaged 617,582 bbl. per day. It has been estimated by engineers that the net fluid withdrawal of the field should be limited to 625,000-650,000 bbl. per day in order to maintain the bottom-hole pressure. The pressure on January 1, 1943, as shown by the tabulation was 1,015.71 lb. per sq. in. and on September 1, 1943, pressure was 1,008.46 lb. per sq. in.—a decline of 7.25 lb. during the production of over 83 million barrels of oil.

The supervisors of the operating department of the East Texas Salt Water Disposal Co. at Kilgore, Tex., are shown in the accompanying photograph. Bryan W. Payne, of the Iowa Payne Oil Co., Tyler, Tex., is president of the company, and J. H. Moyar, Stanolind Oil & Gas Co., Fort Worth, Tex., is secretary-treasurer.

(Continued on page 32)



Number of salt-water injection systems operated by the East Texas Salt Water Disposal Co. and the daily average injection rate in barrels

TABLE 3—SUMMARY REPORT OF EAST TEXAS FIELD SALT-WATER INJECTION WELLS FOR THE MONTH OF AUGUST 1943

Operator and lease—	Well No.	No. of wells in unit	Injection under— Vacuum	Pressure	Bbl. of water for month	Injection cumulative	Injection started
E. Tex. Salt Water Disposal Co.:							
Tom Bell	18	27	.....		103,054	2,137,260	Mar. 1939
C. O. Christian	6	93	.....	*275	224,880	1,482,862	Dec. 1940
S. S. Cook	5	92	.....		127,930	1,246,800	Jan. 1943
C. J. Everet	1	132	30HG		387,600	1,398,258	Feb. 1943
J. D. Henson	7	100	.....		183,870	516,550	Mar. 1942
W. B. Kee	3	79	.....	*250	175,195	788,544	Feb. 1943
J. S. King	9	43	.....	*300	154,760	1,622,459	Apr. 1941
J. A. Layne	1	62	.....		149,302	5,048,876	Oct. 1939
W. R. Nicholson	16	72	.....	*500	69,339	388,436	Sept. 1941
H. A. Pace "B"	38	55	.....	*300	162,025	5,876,418	June 1938
Bryan W. Payne	1 & 2	302	.....	*450	749,810	3,566,809	Oct. and May 1943
Jack Pew	1	69	40HG		299,670	1,247,182	Apr. 1943
T. C. Ramey	1	46	22HG		135,601	3,502,031	Oct. 1940
W. Shaw	3	63	.....		102,690	561,390	Feb. 1943
J. R. Shuman	1	139	30HG		48,070	48,070	Aug. 1943
C. R. Starnes	1	59	30HG		278,020	853,070	May 1943
H. J. Thomas	5	29	.....	*300	93,221	1,114,597	Nov. 1940
A. L. Walker	4	172	.....		84,471	428,218	Dec. 1942
W. R. Wolford	7	14	.....		107,704	619,414	Jan. 1943
General American Oil Co.:							
A. J. Sanders	7	55	.....	*75	152,012	1,168,603	Jan. 1943
Thomas "A"	13	20	.....	*2	147,526	625,555	1943
Gulf Oil Corp::							
A. Douglas	1	95	27HG		210,927	2,836,042	Aug. 1940
Harry Florey fee	1	46	.....	*8	44,228	1,644,357	Dec. 1940
J. W. Trimble	1	151	18HG		134,053	3,220,783	Mar. 1940
Humble Oil & Ref. Co.:							
L. D. Crim	49-S	26	.....	*500	3,033	81,030	July 1941
D. Johnson "A"	1-S	7	10HG		11,131	1,176,617	July 1939
M. C. Thompson	1-S	13	.....	*400	11,741	230,148	July 1939
A. L. Walker	12		.....			41,953	Dec. 1940
Magnolia Pet. Co.:							
C. J. Everet	35	53	Gravity		63,572	984,716	Dec. 1941
M. E. Peterson	6	70	.....		61,593	1,596,124	July 1941
John Radford	45	68	10HG		81,429	3,145,181	Oct. 1940
J. R. Wright	43	53	.....		32,769	908,790	Feb. 1940
Ohio Oil Co.:							
M. M. Cross	9 & 12	25	.....	*90	182,862	7,899,669	Nov. 1939
J. Sadler	1 & 2	42	22HG	*100	227,290	7,373,780	Apr. 1940
J. H. Sharp	4	30	.....		180,132	4,647,342	Aug. 1941
M. L. Thompson	9	12	30HG		139,793	2,100,509	Oct. 1940
Richardson Oils, Inc.:							
Mayfield	2	29	5HG	*5	104,500	2,952,011	Feb. 1941
Selby Oil & Gas Co.:							
Snavely heirs "A"	2	49	.....	*200	70,870	607,512	July 1942
Snavely heirs "D"	13	21	.....	*150	61,379	939,362	Feb. 1941
Sinclair Prairie Oil Co.:							
A. S. Jarvis "A"	9	57	.....	*200	152,519	2,819,890	July 1940
Mayfield "A"	49	24	28HG		50,291	3,119,664	Apr. 1940
Mayfield "B"	20	55	28HG	*120	110,682	336,070	1943
Mayfield "B"	21	11	.....	*700	61,234	1,332,206	July 1940
Peter Tipps	14	4	.....	*350	52,591	1,773,448	May 1940
Amanda Wiley	9	3	25HG	*350	98,230	2,944,761	Aug. 1939
Bunch Wilson	9	19	25HG		124,767	5,282,940	July 1939
R. C. Wright	19	44	.....		104,482	2,700,105	Aug. 1940
Stanolind Oil & Gas:							
R. A. Moores	3	14	20HG	*350	45,857	1,765,302	May 1939
Newman	3	34	20HG	*375	60,127	1,186,067	July 1940
Texas Co.:							
Mae Blackwell	20	22	28HG		50,653	285,712	Jan. 1941
W. T. Chappell	11	10	28HG			440	*Dec. 1941
A. G. Dearing	9	7	28HG		12,127	192,968	Oct. 1941
A. S. Jarvis	16	20	28HG		54,661	921,310	Oct. 1943
W. W. Kersh	5		.....			1,301,155	Aug. 1939
H. L. Phillips	5	9	20HG		44,984	1,512,288	Jan. 1941
L. Radford	1	6	28HG		16,862	384,851	Dec. 1940
S. D. Walker	12	16	28HG			110,522	Apr. 1941
J. W. Wilson	10	13	28HG		44,984	1,349,970	Dec. 1940
E. M. Woods	12	9	28HG		7,848	334,480	Dec. 1940
G. H. Vaughn:							
W. O. Alford	14	13	.....	0 to *1,500	8,935	136,222	July 1941
L. P. Thrash	13	10	.....	0 to *1,200	3,548	51,063	July 1942

*Pounds.

Total number of injection wells 57. Total number of wells connected 2,913. Barrels of salt wated injected during the month of August 6,663,214. Barrels of salt water successfully injected to date 106,447,542.

Tennessee Company's 1,228-Mile Gas Line Given FPC Approval

By Henry D. Ralph

WASHINGTON, D. C.—The Federal Power Commission, September 25, issued a certificate of convenience and necessity to the Tennessee Gas & Transportation Co. of Chattanooga, Tenn., to construct a 1,200-mile natural-gas pipe line from Texas to West Virginia.

For more than 3 years this company has been attempting to build such a pipe line, but did not meet the necessary conditions until September 20. Meanwhile, the Hope Natural Gas Co. of Clarksburg, W. Va., a subsidiary of the Standard Oil Co. (New Jersey) has application pending for authority to construct a pipe line to West Virginia from the Hugoton gas fields of Oklahoma and Kansas. The Hope project presumably will be abandoned for the duration of the war unless something should happen to prevent construction of the Tennessee line.

The Tennessee line will have an over-all length of 1,228 miles between Driscoll, near Corpus Christi, Tex., and Cornwell, W. Va. It will have an initial capacity of 207,000,000 cu. ft. of natural gas per day, which it will obtain from the Stratton-Agua Dulce field in Nueces, Jim Wells, and Kleberg counties, Texas. It proposes to lay 1,156 miles of 24-in. pipe from Driscoll, Tex., to Kenova, W. Va., and 72 miles of 18-in. pipe from Kenova to Cornwell, near Charleston, W. Va., where gas will be delivered to the compressor station of the Hope Natural Gas Co. for local distribution. The proposed initial compressor installation for the entire project is 58,000 hp., located at six stations having approximately ten 1,000-hp. units each, and one station with eight 1,000-hp. units. It is planned to deliver 167,000,000 cu. ft. per day at Cornwell and 40,000,000 cu. ft. per day at Kenova. Local distribution and use of natural gas is at present under the control of the War Production Board.

Delivery of 207,000,000 cu. ft. of natural gas daily for a period of 25 years is the nucleus for the natural-gas line which will originate at Driscoll, Tex., and extend to Cornwell, W. Va., Chicago Corp.'s reserves in the Stratton-Agua Dulce field, in Jim Wells, Nueces and Kleberg counties, Texas, and another field in the vicinity of Edinburg, Tex., are estimated 3 trillion cubic feet.

The Tennessee Gas & Transportation Co. was formed about 4 years ago to build a pipe line from Louisiana to the Tennessee Valley region. One of the organizers, and president of the company, was Curtis B. Dall, former son-in-law of President Roosevelt

On September 3 the Tennessee company filed an amended application with FPC proposing to obtain its gas near Corpus Christi instead of in Louisiana. This met the first and third conditions laid down by the commission, since no objection was raised to the use of this gas and WPB stood ready to allocate the steel, but throughout the hearings, which were held during the middle of September, the Tennessee company was unable to give adequate assurance of its ability to finance the line.

However, on the last day of the hearings, September 20, the Tennessee company announced that it had arranged financing through the Chicago Corp., and the commission announced immediately that the company would be given a certificate to start construction. Hearings on the Hope application had previously been scheduled to open September 21, but officials of FPC explained that the Tennessee company had preference because of its many prior attempts to build a line and had finally succeeded in meeting all FPC conditions, and that since the WPB deadline was so near it was desirable to announce a decision at once. The following day attorneys for the Hope company requested that its application be held in suspension until at least October 5 so that it would still be pending in case the Tennessee application should default for some reason.

In its formal opinion of September 25, the FPC stipulated that construction of the new line must start before February 1, 1944, and must be ready for operation by next winter, and that during the war it must be operated as a part of the war program. It also stipulated that the company must submit full details of its financing plan before the certificate becomes fully effective.

Apparently, the Tennessee project was saved at the last moment through a deal with the Chicago Corp., which is a "closed-end, nondiversified" investment company representing the Marshall Field estate. The Chicago Corp. maintains an office in Corpus Christi, and in 1941 it acquired extensive natural-gas properties in the Gulf Coast area.

On September 21 it was announced in Chattanooga that stockholders of the Tennessee company voted to sell control to the Chicago Corp., and that Lt. Col. Dall had resigned as president. Chicago Corp. purchased the company's entire preferred stock

Construction Work to Start Immediately

CHICAGO, Ill.—Construction of the Tennessee Gas & Transmission Co. natural-gas line from the Corpus Christi, Tex., area to West Virginia will start immediately, according to Gardiner Symonds, vice president of Chicago Corp., which has acquired a major interest in the Tennessee company. In regard to construction features of the project he has given the following information:

Orders for 215,000 tons of steel for the pipe, principally of 24-in. diameter, have been placed with National Tube Co. and A. O. Smith Corp. Deliveries of pipe are due to commence in December.

Specifications for contractors laying pipe will be issued in about two weeks and contracts will probably be let in about three weeks. It is expected that spreads now engaged in laying the War Emergency Pipelines, Inc., 20-in. products line will be moved to the Tennessee line after WEP contracts are completed.

Construction is to be directed by Ray C. Fish, vice president, from an office which will be opened soon at Houston, Tex.

and 90 per cent of its common stock for $500,000, and a new set of officers will be elected. It is understood that the Chicago Corp. has at hand about half the funds required for the project, and the balance will be obtained under plans to be approved by the FPC

The FPC opinion states that the Chicago Corp. owns or controls more than 2 trillion cu. ft. of recoverable gas reserves in the Stratton-Agua Dulce field which are available for the new line, and in addition is the owner of 1 trillion cu. ft. of gas located in the vicinity of Edinburg, Tex., and has entered a contract to sell gas to the Tennessee line. Existing reserves of the Chicago Corp. are estimated to have a life of at least 33 years based on annual withdrawals at the rate of 75 per cent of the initial pipe line capacity. Tennessee has contracted for deliveries of 207,000,000 cu. ft. per day for 25 years.

The opinion also states that an agreement between the Chicago Corp. and the Manufacturers Light & Heat Co., contemplates deliveries of from 50,000,000 to 100,000,000 cu. ft. of such gas for the use of the Columbia Gas & Electric system through the new line at a point in the Appalachian area. It is understood that this additional gas will be taken off the line in the vicinity of Ashland, Ky.

An interesting point in the commission's opinion is its dismissal of the objections raised by the coal interests. FPC said it recognized the competition between gas and other fuels, but declared that it does not have authority to determine the end use of natural gas nor to arbitrate questions of competition among fuels.

Knowlton and Pike Clash Over Price Question

(Continued from page 18)

drawals from aboveground stocks. He said two new pipe lines to be built from West Texas will provide transportation outlet for all surplus production capacity now existing in the United States and that unless there are big new discoveries the only increase must come from secondary recovery, rehabilitation and retention of stripper wells.

Discovery Cost Quadrupled

PAW estimates that during the middle 1930's, cost of finding crude oil ranged between 12 and 15 cents a barrel; during 4 years ending with 1941, costs averaged 35 cents; and new reserves discovered in 1942 cost 60 cents per barrel to find, or four times the 1938 cost, not including cost of production or future development, Mr. Knowlton said. He explained that many producing companies may still be showing profits because they are selling oil that cost little to discover but are depleting inventories which must be replaced at much higher cost.

The committee referred to protests of producers on use of material. Mr. Knowlton said there are absolutely no restrictions on wildcatting and exploration, and that while restrictions in older fields may have reduced production somewhat these are being relaxed as fast as WPB makes steel available.

The committee asked why the president's recent message said oil production has increased 66 per cent since the outbreak of war. Mr. Knowlton said this must be an error, and Mr. Pike said the figure must lack a decimal point because "6 per cent would be about right."

Mr. Pike said increased production of California and Wyoming heavy crudes, following OPA price increases, does not indicate what would happen nationwide because these were proved and shallow fields where price was punitively low because the oil was a drug on the market before the war. He said WPB should allocate more steel for oil production and transportation which would do as much as a price increase to boost production but that manpower shortages might nullify either remedy.

Mr. Pike estimated that the United States can produce 1,600,000,000 bbl. of crude in 1944 without exceeding maximum efficient rates and without a price increase now, but admitted that the situation might change in a few months and that a price advance might be justified some time.

The subcommittee intends to make a report on the oil situation soon and is expected to make strong recommendation for a crude-price increase.

Railroads Assigned October Fuel-Oil Quotas

HOUSTON, Tex.—Fuel oil available to railroads from refineries in Districts 2 and 3 to carriers east of the Rocky Mountain states was apportioned here September 27 for October at a meeting attended by the representatives of refiners, the railroads, PAW and ODT.

The distribution revealed that fuel oil is more freely available at refineries, all the railroads being able to secure their October quota. The monthly meetings were inaugurated in December 1942 during a shortage period for the purpose of distributing the fuel-oil supplies equitable and with minimum transportation from refineries to rail terminals. The October quota in the case of District 3 totaled 4,000,000 bbl.

DEATHS

Chester L. Bradbury, 46, sales manager of Walworth Co., oil-well supply firm, died September 20 of a heart attack. He had suffered a previous attack last June.

D. P. Young, 53, oil-field worker, was killed September 23 in a boiler explosion in the oil fields near Denver City, Tex.

Jacob S. Young, 86, retired oil operator who went to Wichita from Chanute, Kans., 7 years ago, died September 19 in Wichita.

Fred E. Guthrie, 46, Dallas, Tex., oil operator, died at his home September 24 after a long illness. Mr. Guthrie came to Texas in 1930 from Prescott, Ark., operating in the East Texas field.

John Harold Howard, vice president and general manager of Globe Oil Tools Co., Los Nietos, Calif., died of a heart attack September 20, at his home in Whittier, Calif. Mr. Howard became associated with Globe in 1930 as production manager, and was advance to his last position in 1934. Prior to his connection with Globe, he was identified for a number of years with General Petroleum Corp. and the W-K-W Co.

Fred E. Guthrie, 46, independent oil operator, died in Dallas, Tex., September 24, after a long illness. He lately operated in the East Texas field, with headquarters in Longview.

Fewer Grade 1 Tires Available, OPA Finds

WASHINGTON, D. C.—After consultation with the Office of Rubber Director as to the supply of new tires, the Office of Price Administration last week restricted eligibility for new passenger tires (Grade 1) to "C" book drivers with a mileage of 601 miles or more per month.

This removes from new tire eligibility all "B" drivers and some "C" book holders. Such drivers will now be eligible only for used and recapped tires. Previously all car owners whose mileage totaled 241 or more miles per month could obtain ration certificates for Grade 1 tires—prewar or new synthetic. If such tires were not available, however, the Grade 1 ration certificate could be exchanged for one authorizing the purchase of a Grade 3 tire.

The new restriction is necessary, OPA explained, to assure that the gap between the dwindling supply of prewar tires and adequate supplies of new synthetic tires for passenger cars is bridged successfully.

Key operating men in the East Texas Salt Water Disposal Co.: C. O. Doub civil engineer; L. H. Dial, chief engineer; R. L. Hayes, inventory; N. N. Jones, superintendent; F. R. Files, purchasing agent; W. S. Morris, vice president and general manager; T. O. Roberts and D. K. Morgan, field foremen; J. L. Dellinger, pipe-line superintendent; Roy Copeland, assistant superintendent; W. B. Doty, field engineer; R. J. Bethancourt, electrical engineer; A. R. Scharnagel, chemist, and A. J. Stalcup, construction foreman

Salt-Water Injection Sustains East Texas

(Continued from page 29)

In Table 3, the volume of salt water injected by each of the salt-water disposal systems in the East Texas field is shown for the month of August 1943. The tabulation also shows the operating pressure at the injection well head, the total water injection into the wells, and the date operation began. Since the program of salt-water injection started in the East Texas field in June 1938 by the Sun Oil Co. on its Pace "B" lease in the Vargas Survey, over 100 million barrels of salt water have been returned to the Woodbine sand.

Acute Position of Oil Supply Outlined

(Continued from page 21)

ducible crude oil will come from secondary recovery, pressure maintenance and possibly mining. He reported that current fields, according to estimate of geologists and engineers, would contain 27 million barrels of crude oil after the ultimate by current producing methods is reached.

Difficulty of applying current concepts of secondary-recovery operations to California's reservoir conditions was explained but Mr. Pyles expressed confidence that ways of vastly improving existing techniques would be developed. He was also optimistic about the future application of pressure maintenance, although he called attention to diametrically opposed views among two factions of California oil men on the question of whether the method offered material promise of increased recovery.

Mr. Pyles said he was willing to hazard a guess that California fields will be the primary source of supply for the Pacific Coast territory for at least 30 and perhaps 50 years, provided the dictates of good judgment are used by those in authority who set the prices this industry receives for its goods and services.

High Severance Tax On Gas Recommended

STRONG recommendation for high severance taxes on natural gas produced in the Southwestern states for consumption in the coal-rich eastern industrial area was made before the Interstate Oil Compact Commission meeting last week at Santa Fe, N. M.

The proposal came from Dr. Eugene A. Stephenson, professor of petroleum engineering at the University of Kansas, who predicted that consumption of natural gas will increase to an annual rate of 4 trillion cubic feet by 1946. At the current rate of increased consumption, Dr. Stephenson calculated that by 1950 approximately half of the country's estimated reserve of 85 trillion cubic feet will have been used.

The Kansas professor was highly critical of the trunk gas-line projects approved by the federal bureaus, saying that at least 1 year will be required for construction, and that movement of necessary materials will place an additional burden on heavily overloaded railroad - transportation facilities.

He questioned whether the major gas lines now projected were for postponement of the time when eastern consumers will be forced to use manufactured gas. In such an event, he said, it would be preferable to accept the inevitable a few years earlier rather than throttle "our own industrial expansion forever."

If the new lines are for the purpose of transporting a valuable raw material to chemical manufacturing plants, Dr. Stephenson declared it would be more desirable to bring the processing facilities to the source of virgin components, instead of further congesting an over-industrialized section of the country.

Ben Franklin Posts Higher Oklahoma Price

Ben Franklin Refining Co., Tulsa, last week followed Gulf Oil Corp. in posting the regular Mid-Continent gravity scale for crude purchased in the Healdton, Oscar, Spring and Soay fields, Jefferson and Carter counties, Oklahoma, effective September 7. The new Ben Franklin schedule starts at 85 cents for below 21-gravity oil, ranging up at increments of 2 cents per degree of gravity to a top of $1.25 for 40 and above.

The advance of 7 cents per barrel in South Oklahoma fields was authorized September 7 by the Office of Price Administration.

Lee R. Cowles Resigns From PAW Transportation Post

WASHINGTON, D. C.—Lee R. Cowles has resigned as assistant director of the Transportation Division of the Petroleum Administration for Was to return to his former position as traffic manager of the Standard Oil Co. of Indiana in Chicago. Mr. Cowles has held the PAW post since April 1942.

Ralph P. Russell is serving as acting assistant director. He has been chief of the rail transportation section since September 1941.

Alloys Best Suited to Resist Sour Crude Corrosion at High Temperatures

by Arch L. Foster

A GENERALIZATION which may be made on the refining of sour crudes is that, at temperatures normally prevailing in storage, in topping and distillation operations, chemical treatment, the addition of chemicals, such as ammonia, lime, soda, etc., to crudes and crude products, serves the purpose of preventing or greatly reducing corrosion from high sulfur compounds. At high temperatures, such as those encountered in the cracking still, no amount of chemical treatment will serve the same purpose as well as will the use of alloys of metals which are relatively unattacked at the temperatures by the amounts and kinds of sulfur present in the charge stock.

In general, therefore, say a majority of the qualified refiners experienced in handling and refining sour crudes, chemical treatment either in concentration or in solution in water may be used on sour crudes and gases in the field and the refinery up to the point when relatively high temperatures are employed; after that, alloys are the most profitable and successful to use to combat corrosion. General practice agrees with these conclusions; in fact, they are the result of investigations of general practice, although exceptions to these practices exist.

Proper handling of high-sulfur crudes, especially those containing important percentages of H_2S (hydrogen sulfide)—and most high-sulfur crudes do contain a great deal of this dangerous gas—begins in the field. Field and other storage tanks when desired may be equipped with controlled vents, by which the gases released are conducted to a central treating unit for the removal of H_2S. Here the gas is treated to reduce the hydrogen sulfide to negligible concentration. For example, Gulf Oil Corp. in western Texas employs the Koppers sodium carbonate process, in which the gases from the crude oil-gas separator tanks are washed with an Na_2CO_3 solution containing 2-3 per cent by weight of the carbonate in a countercurrent system passing the gas through the solution before compression. This system reduces the H_2S to five grains of sulfur per 100 cu. ft. of gas. This step can be carried out in plain carbon steel equipment; it does not remove mercaptans, at least not to any considerable degree; these compounds must be removed by other means if removal is required.

Increasing demand for crude coupled with a declining discovery rate, requires increased utilization of sour crudes. This is the fifth article carried by the Journal in recent months showing how problems posed by these crudes have been met. Other articles on this subject are Neutralization, Alloy Steels Used in Handling Sour Crudes, by J. P. O'Donnell, June 3; California Plant Adapted to Refine Sour Crude, June 17; Sulfur Removal From Sour Crudes Reduces Corrosion, Improves Product Quality, by Arch L. Foster, June 24, and Problems Involved in Conventional Refining of Sour Crude, by R. B. Waite and R. H. Aitken, August 5.

Field Practices

In handling the crude itself, no pretreatment in the field is normally employed, other than to settle out the water produced with it. Water trapped from West Texas crudes is high in H_2S and also has undesirable amounts of HCl (hydrochloric acid), and so some protection must be used on the drip tanks or traps; this may take the form of gunite lining, special paints, or ammonia may be injected into the crude or into the water settled therefrom, to reduce the corrosion. At atmospheric or low temperatures the ammonia will remain in the liquid phase and will keep the crude and the water in a noncorrosive state.

Gas from West Texas crudes is very toxic and has caused some casualties among personnel since the discovery of that field. Excellent discussion of this phase of sour crudes is found, along with voluminous data, in U. S. Bureau of Mines Bulletin 231, "Investigation of Toxic Gases From Mexican and Other High-Sulfur Petroleums and Products," by R. R. Sayers and others. According to data reported in this bulletin, dogs exposed to a concentration of 0.12 per cent H_2S in air died in a few minutes. Dogs die in 10 to 15 hours when exposed to as low as 0.035 per cent H_2S in air. Concentrations as low as 0.01 per cent have been proved to be very definitely irritating to man after an exposure of some hours. Consequently extreme care must be exercised to avoid exposure of personnel to any appreciable concentration for any extended time; a few minutes exposure to high concentrations results fatally.

Another peculiarity of H_2S and of mercaptans is that they are much more corrosive to equipment when found together than when either is found alone in equivalent amounts, without appreciable amounts of the other being present. Either free sulfur or H_2S, if present, increases the reactivity of the mercaptans.

In the protection of storage tanks at refineries, gunite is one of the best materials. If any appreciable amount of water settles out of the crude in these tanks, it is necessary or very desirable to cover the tank bottom with gunite or concrete, the thickness of the covering being determined by the seriousness of the corrosion attack. Corrosion takes place on the tank bottom especially in the presence of water; the presence of HCl in the water aggravates the

The busy refinery of Gulf Oil Corp. is putting out large quantities of war-critical petroleum products to meet the growing demands of the bombers. Large amounts of high-sulfur "sour" crudes have been processed in this plant

situation. Depending on the composition of the gunite, the presence of HCl may or may not complicate the situation; if the HCl can attack the gunite successfully, corrosion will continue. Corrosion is also bad on the inside of the tank roof and on the side walls above the liquid level. Paints impervious to H_2S and/or HCl have given some good results; again gunite serves an excellent purpose here, as well as on roof supports, braces and other inside metal exposed to liquid or vapors.

In the practice of several companies, including Gulf Oil Corp., gases from operating units go to a Koppers soda ash or sodium phenolate treating unit. Treatment with sodium phenolate reduces the H_2S to a low figure in the treated gas. It is believed that corrosion by phenolate-treated gases is considerably lower, even at elevated temperatures, than it is with soda ash-treated gases; in each case mercaptans still remain in the gases if originally present. Hydrogen sulfide removed from these gases may be burned safely in furnaces, under boilers, etc., which employ brick or other nonmetallic stacks. If burned in units using steel stacks, the chances for corrosion by the sulfur oxides formed, in the presence of water vapor in the combustion gases in the upper, cooler parts of the stack are appreciable. If large concentrations of sulfur-gases are burned, it is possible to create a difficult situation near a municipality or in connection with residents of a locality which may necessitate other ways of disposing of the sulfur.

Handling Distillation, Topping

Plenty of corrosion will occur in topping stills with high-sulfur crudes, especially those containing H_2S, mercaptans or HCl. In evaporator and fractionating towers, gunite may be used to cover completely the walls and bottom, since at least some water is present generally, whether or not steam is used. Trays and bubble caps, risers, etc., of Meehanite have been successfully used. Meehanite is a high carbon, high silicon cast iron.

The usual practice of Gulf in preventing corrosion of West Texas crude topping units is to gunite line the towers, construct the trays and caps of Meehanite and introduce ammonia into the oil vapor lines leaving the towers. The principal purpose of the ammonia is to reduce corrosion in the oil vapor condensers or exchangers by neutralization of the HCl and H_2S present in the condensed water vapor. It is generally believed that HCl accelerates the corrosion by H_2S in the presence of water and, when the HCl is neutralized it has been experienced that the corrosion of cast iron condensers is negligible. It is necessary to have a sufficient amount of water present to completely dissolve all ammonium chloride formed to prevent the latter from plugging the lines and condensers.

It is not good practice to inject ammonia into a fractionating tower, or reflux streams entering a tower, due to the fact that insufficient liquid water is present to dissolve the ammonium chloride formed; consequently, the trays, caps and vapor lines will likely become plugged with solid ammonium chloride.

The principal reason why the injection of ammonia into high temperature stills will not prevent corrosion by sulfur compounds, even though it may neutralize both HCl and H_2S, is due to the fact that ammonium sulfide is approximately as corrosive at the high temperatures as is H_2S. Also, at the high temperatures, ammonium chloride and ammonium sulfide will decompose to again liberate corrosive sulfides, and possibly chlorides.

In pressure still fractionators aluminum bubble caps have been used successfully in the absence of HCl. Most of the gunite used in Gulf plants is a mixture of Lumnite cement and crushed fire brick.

Handling Reduced Crudes

Reduced crude is the original crude after gasoline, naphtha, and kerosene and gas-oil fractions have been removed. At ordinary temperatures or at those employed in topping, a larger percentage of sulfur can be permitted in the heavier fractions, without serious corrosiveness resulting, than in the light fractions. Reduced West Texas crude is a high pour, viscous residuum, and frequently is cut with light fractions such as pressure distillate bottoms or recycle gas oil from the cracking unit to lower its viscosity and simplify pumping and handling.

One very convenient method of handling high sulfur reduced crude is to run it to coke—a sort of exaggerated viscosity-breaking step. The coke will contain 3 to 4 per cent sulfur and finds wide application industrially in war times. In this manner a great deal of H_2S and hydrocarbon gases will be formed, to be burned under stills, boilers, etc. By running residuum to coke and cracking the overhead fractions, including practically all liquid which goes overhead, a larger yield of gasoline, generally of slightly higher average octane number, will be produced than if the attempt is made to crack the residuum "as is" in a separate cracking coil.

The straightrun gasoline, incidentally, from West Texas crude will range from 0.10 to 0.25 per cent sulfur. It may be washed by the so-called Seaboard process—soda ash—to re-

2 In the Army Air Forces, it's the UC-43; in the Navy, the GB-2 BEECHCRAFT utility transport. An aerial "work-horse," this BEECHCRAFT performs many duties both in this country, and behind our battle-fronts all over the world. Its prototype is the commercial D17S BEECHCRAFT biplane, long known for its high cruising speed and ability to land in limited space on rough terrain.

3 The AT-10 BEECHCRAFT transitional trainer accustoms student pilots to the handling of large multi-engine tactical aircraft. Beechcraft's only exclusively military type, it is an all-plywood plane designed in 1940 to use a minimum of critical materials in its construction, and to be easily maintained.

4 Closely resembling the commercial 18S BEECHCRAFT airline transport, the C-45 (Navy JRB-2) provides swift, safe transportation for command personnel in the United States and abroad. In addition to deicing and anti-icing equipment, the C-45 BEECHCRAFTS and a later series, the C-45A, carry special devices broadening their utility to the Air Forces.

5 The rapidly expanding air forces of the Army and Navy have found in the AT-7 (Navy SNB-2) BEECHCRAFT navigational trainer an important adjunct in the development of competent navigators. The AT-7 is equipped with all of the modern devices for celestial navigation, as well as for radio and dead-reckoning navigation.

6 First of all twin-engine BEECHCRAFTS delivered to the Air Forces, early in 1940, the F-2 photographic BEECHCRAFT carries two tactical mapping cameras mounted in tandem, and other special-purpose cameras and equipment. It is shown in service over Alaska.

1 In BEECHCRAFT AT-11's (Navy SNB-1's) bombardiers are trained for the flying forces of our Army and Navy. These sturdy trainers are provided with all of the bombing equipment carried by the largest bombers, and their high operating speed, long range and excellent flight and landing characteristics afford opportunity for invaluable training and experience in all types of high and low level bombing.

Beechcrafts at work

Of the six specialized types of *Beechcrafts* shown here at work for the U. S. Army Air Forces and Navy Bureau of Aeronautics, five are adaptations of commercial models which gained world-wide favor in pre-war civilian life. ★ Both these military *Beechcrafts* and their commercial prototypes earned preference through their demonstrated qualities of efficiency, stability, sturdiness, and high cruising speeds combined with low landing speeds. ★ Today, *Beechcrafts* do their part as units of the world's finest air forces. When peace is won, *Beechcrafts* will also do their part in the new world which air power is creating.

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duce hydrogen sulfide by about 80 per cent. Washing with dilute caustic solution reduces this value still further, but is more expensive. The straightrun gasoline may be sweetened by doctor, Perco copper chloride or by any other method employed for sweetening. Perco desulfurization can be used without first removing H_2S. In fact, the specialized sweetening processes are made to order for West Texas gasolines, and show especially good results, one large operator states. The nonsulfur sweetening processes are by far the best; doctor treating reduces octane number appreciably, also may reduce lead susceptibility if not handled with great care and exact control, operators say.

Reforming straightrun gasoline after H_2S removal reduces the sulfur content by approximately 50 per cent without treating (except for H_2S removal) with a corresponding increase in H_2S production during the reforming. Less corrosion occurs with this operation than when cracking heavier fractions. Carbon steel reforming still tubes may be used with some success, but are not recommended as regular practice, as their life is shortened greatly, even with the best, most carefully regulated operation. Opinions differ somewhat on this point, as to the best and most economical alloy to use; that is, the simplest and cheapest alloy which will "get by" with a reasonable corrosion rate. Some operators believe that in reforming this high-sulfur straightrun gasoline or naphtha 2 per cent chrome, with preferably ½ per cent molybdenum is the minimum practicable alloy. Others have stated that 4-6 per cent chrome-½ per cent molybdenum tubes are the minimum permissible. One operator goes so far as to say that mild, stainless type chrome steel should be used with any of these charge stocks, naphtha or lighter.

Refining Kerosene From West Texas Crude "Tricky"

Production of a first-grade kerosene from West Texas distillate is a problem requiring a great deal of experience, of "know how" to obtain a satisfactory product. Various specific tricks are required to get the desired results. To get a good burning test is one of the difficulties. The kerosene cut is first treated heavily—25-35 lb. per bbl. of 98 per cent sulfuric acid—it may then be rerun, followed by a light acid treat, which will yield a good product if the details of treating, rerunning and washing are carried out properly. The boiling range should be about the minimum of standard specifications for the best burning test. The sulfur compounds which give trouble are aromatic sulfur compounds, some at least of the thiophene type. After acid treating and rerunning, the kerosene must be sweetened. In this case, since octane number is not a factor, doctor sweetening gives a good product if care is observed to keep the sulfur to a minimum.

Furnace oil cuts from these crudes must be sweetened to improve the odor by removal of any H_2S and the mercaptans which are present. When odor is not a limiting specification these furnace oils may be finished by caustic washing to remove H_2S.

Cracking West Texas Crudes Accentuates Corrosion

In general, the higher the boiling range of a cut the higher the corrosion effects during cracking. Sulfur content of West Texas crude fractions may vary between about 0.3 per cent in naphtha to 0.4 per cent in the kerosene distillate, 0.5 to 0.6 per cent in furnace oils and up to 0.75 to 1.25 per cent in heavy gas oils, with heavy residuum running into several per cent of sulfur, the amount depending on the sulfur in the raw crude as well as on the distribution of sulfur; that is, the proportion of low-boiling and high-boiling sulfur compounds present.

Qualified experienced refiners are practically unanimous in stating that the use of alloy steels in tubes, headers, transfer lines, etc., is imperative for successful and economical cracking of West Texas crude fractions. The minimum alloy permissible depends mainly on the temperature employed. At low pressures and very high temperatures the refiner should go to stainless steel types of 12 per cent chromium or even higher, up to 18-8 chrome-nickel steels, to avoid serious corrosion. As pressure is increased, also, the minimum alloy requirements are increased.

Catalytic cracking of these crudes may be carried out with somewhat lower alloys—that is, lower in chrome, nickel, etc.—than in thermal cracking due to lower temperatures and especially lower pressures employed in catalytic cracking. Nevertheless, tubes, etc., must be protected against corrosion by the alloy selected. Most refiners believe that the use of neutralizers is not and cannot be successful, that alloys are the only solution for tubes, headers and transfer lines. Chambers such as flash chambers, vaporizer chambers and the flash section of fractionators have been lined with gunite successfully, although replacement and repair of linings is necessary at regular intervals.

Practically any heavy metal catalyst is injured by the sulfur is West Texas, catalysts such as nickel, chromium, iron and similar oxides and salts as well as free metals. The alkaline earth and similar oxides, as alumina, Al_2O_3, silica, SiO_2, etc., are probably not damaged seriously. Therefore, such catalysts as bauxite, aluminum hydrosilicates, and mixtures of alumina and/or silica with other catalytic materials doubtless will serve satisfactorily in catalytic operations on high sulfur crudes. Catalytic treatment partially desulfurizes the stocks, and thus simplifies refining operations on distillates.

Treatment of High-Sulfur Cracked Distillates

The low-pour tarry residues formed in thermal cracking, although heavy in sulfur, make good heavy fuels of the Bunker C types and heavier. Cracked gasoline must be desulfurized and long experience has shown that low temperature desulfurization with sulfuric acid is one of the best methods to accomplish this result. Other methods, such as catalytic desulfurization with bauxite also give good results, but with low catalyst life, as references in the literature indicate. A general rule is that the higher the sulfur content the lower the treating temperature should be for optimum results. One of the properties susceptible to damage by acid treating is octane number, and the lower the temperature of treating the less the octane number loss sustained, experienced refiners say. The Stratcold type process, a combination of acid contact in Stratford contactors, with the Halloran refrigerated treatment, has been widely and successfully used for this purpose, as has the Perco type of catalytic desulfurization.

When treating temperature is not controlled, it is considered best to use not more than 5 lb. of 66° acid; this is a better concentration than is 98 per cent acid, since octane number reduction is less and solution of desirable constituents in the acid sludge, as well as polymerization loss, is less than with "98" acid. If the temperature is controlled satisfactorily, any desired amount of 98 per cent acid may be used successfully though oil losses will increase with increased amounts of acid. The amount used depends, of course, on the amount of desulfurization wanted. In general it is not practicable, because of treating losses of material and octane number, to make gasoline of maximum 0.1 per cent sulfur from West Texas crudes alone.

Generally it is considered more economical to desulfurize the straightrun gasoline fraction separately with 5 lb. of 98 per cent acid per barrel and to blend with the acid treated and rerun cracked distillate. The straightrun gasoline is acid treated and neutralized but not generally rerun. The cracked distillate is best treated with acid in continuous, countercurrent operation with a series of stages, two or more, the temperature being determined by the wishes of the operator on the basis of the characteristics of the individual raw product treated. No appreciable advantage is obtained by multistage treating of cracked distillate when

the temperature is uncontrolled. Normally, to make a gasoline of 0.2 per cent sulfur requires only a light—2 lb. per bbl.—acid treatment at low temperature. Without acid treating the sulfur of the finished distillate will, or may, run 0.23-0.25 per cent or higher, which, even with relatively low-sulfur straightrun to blend with it, will yield a motor fuel too high in sulfur to meet many state specifications.

One problem involved in light acid treating these distillates is that, if the acid treat is too light, the amount of gum left in the product may be too high with the result that gum troubles appear in use. Therefore in localities where low sulfur is not mandatory, the amount of acid used in treating may be dictated by the gum present which must be removed. Answers to this question are arrived at only by trial-and-error experience with the individual distillate in each refinery, where most variables will be different in degree in any refinery from those obtaining in any other plant. Generally, say technologists, acid treatment for a 30 per cent sulfur reduction is adequate to reduce the gum content satisfactorily in most distillates, and to solve the color problem as well; provided, the distillate is subsequently sweetened by almost any process other than doctor sweetening. It is positively necessary to rerun acid-treated pressure distillate to obtain a satisfactory product. When rerunning it is very important to "keep maximum temperature to a minimum," to avoid decomposition of sulfonic acids and vaporization of decomposition products which will dissolve in the overhead condensate, damaging color, sulfur content, and odor of the product.

Distillate Bottoms

Pressure distillate bottoms may be treated to furnace-oil requirements if desired. Whether or not this is carried out as a commercial, general proposition will depend on the properties of the bottoms in a given plant, the market demands for furnace oils and the cost of refining the bottoms to a marketable product. Treatment may be either by sulfuric acid or by solvent extraction. Solvent extraction has the advantage that no sulfonic acids or other byproducts of acid are left in the finished product while the sulfur and gum constituents are removed practically quantitatively. Acid treating the bottoms is expensive in acid, in sludge losses and in oil losses as such dissolved in the sludge; organic-sulfuric compounds may be dissolved in the treated oil, to confound the refiner in service with the customers. More generally these pressure distillate bottoms are used as reduced crude or heavy residual cutting oils—as mentioned above—to reduce viscosity and increase pumpability when these heavy oils are sent to cracking units or for any other purpose. If the cut oils are cracked this arrangement recycles the distillate bottoms, increasing the ultimate yield of gasoline correspondingly. To crack these cut oils, considerable care must be given to prevent corrosion in the cracking still.

Use of $AlCl_3$

In connection with special petrochemical products it has long been known that anhydrous aluminum chloride, $AlCl_3$, is an efficient desulfurizing agent. Russian investigators* have announced results of treating aluminum chloride sludges from treatment of high sulfur gasoline (0.35 per cent S). Three to nine per cent of the anhydrous chloride was used to treat the gasolines; the resulting sludge is acidified and the released liquid washed with dilute caustic. The product consists of organic sulfur compounds with 5 to 10 per cent of sulfur. These products darkened rapidly on exposure to light and air. This reaction indicates why most of the sulfur, especially the reactive type of sulfur present in pressure distillates, must be removed, to prevent the gasoline from going off color in storage, since this darkening of these relatively pure compounds of sulfur indicates that they are the culprits in commercial products doubtless in collaboration with gum-forming hydrocarbons. The yield of crude sulfur compounds is up to 5 per cent of the gasoline treated. Sulfur left in the treated gasolines ranged from 0.0 to 0.04 per cent, these authors reported.

*"Desulfurization With $AlCl_3$," Tsyganok and Vanyukova, Vost. Neft. 9, 1940. Translation, Pet. Engineer, July 1943, p. 75.

TABLE 1—HIGH-SULFUR CRUDES IN TEXAS†

County—	Type crude	Sulfur, per cent	Gravity, °A.P.I.	Gasoline and naphtha, per cent
Ector	Inter.*	1.38	33.0	29.3
Yoakum	Inter.	1.90	34.2	32.6
Howard	Inter.	2.02	26.8	21.2
Howard	Inter.	2.54	26.6	27.0
Howard	Inter.	2.16	27.1	12.1
Howard	Inter.	3.43	26.6	22.2
Howard	Inter.	2.16	26.3	10.9
Crane-Upton	Inter.	2.69	31.1	26.8
Andrews	Inter.	4.17	22.5	14.4
Howard	Inter.	2.32	29.9	28.5
Mitchell	Inter.	2.01	27.5	28.5
Scumy	Inter.	2.06	27.9	27.9
Crane	Inter.	2.13	34.6	31.1
Upton	Inter.	2.99	22.1	6.3
Upton	Inter.	2.29	24.5	14.5
Upton	Inter.	2.23	25.6	15.8
Andrews	Inter.	2.36	29.3	22.2
Ector	Inter.	2.59	30.8	22.0
Mitchell	Naph.	3.92	22.3	25.6
Mitchell	Naph.-Inter.	2.52	25.6	27.4
Mitchell	Naph.	3.01	24.0	26.6
Hopkins	Par.-Inter.	2.95	24.5	16.2
Franklin	Inter.	2.96	22.8	13.2
Titus	Par.-Inter.	2.76	25.0	13.7
Titus	Par.-Inter.	2.77	24.5	13.6
Jefferson	Naph.	2.31	19.7	00.0

*Inter.—Intermediate type crude by Bureau of Mines System of Classification.
†From U. S. Bureau of Mines analyses.

While theoretical prospects for special products and chemical compounds from treating sludges from West Texas and other high-sulfur crudes are high, actual commercial production of petrochemicals from these sources is small to nil, so far as is generally known. The polymerization losses in acid treating are high at high-treating temperatures, the higher the temperature the higher the losses. It is mainly for this reason, combined with that of high solubility of olefins and isoparaffins in the sludge at higher temperatures, that makes low temperature treating so profitable and so important as compared to higher, uncontrolled temperature treating. It is highly profitable also to remove all the oil possible from the acid sludge when separating distillate and sludge. Therefore centrifuge or other positive means of separation, and maintenance of low temperatures throughout are very desirable factors to watch and control carefully.

Effect of Low Endpoint

One of the numerous tricks of the trade with these high-sulfur distillates is to cut the endpoint of the raw pressure distillate high enough that much of the sulfur present will remain in the distillate bottoms when rerunning. For example, if a 400° F. end point finished cracked gasoline is to be made, the raw distillate from the primary fractionator in the cracking unit should be cut at, say, 420° F. end point. In this way the heavier sulfur compounds will remain dissolved in this heavier end or bottoms when rerunning the treated, neutralized and washed distillate, reducing the total sulfur in the final product. Innumerable tricks are learned, experienced operators say, which enable the refiner to make better products, lose less of the desirable characteristics, lose less of the raw product, increase yields and "keep out of trouble." One operator with very long experience has stated that any reasonably good refiner with good general experience can operate on high-sulfur crudes if he can get alloys where needed to handle the corrosion problem.

Acknowledgment

We acknowledge, with thanks, the assistance of experienced technologists of Gulf Oil Corp. in obtaining much of the information contained in this article by means of the publication of which we hope to assist in the dissemination of knowledge required to refine sour crudes satisfactorily, among refiners who may be called on in the future to refine such crudes for the first time.

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Bottom-Hole Choke Reduces Gas-Oil Ratio in K.M.A. Wells

by Harry F. Simons

Reduction of gas-oil ratios and prolongation of flowing life in oil wells is always vitally important because of the effect on production costs. Bottom-hole chokes installed in the Strawn sand wells at K.M.A., Texas, have reduced gas-oil ratios approximately 30 per cent and have made it possible to obtain the allowable by flowing instead of artificially lifting. Over 70 of the wells are now equipped with bottom-hole chokes.

THE bottom-hole choke is not a new tool in the oil-producing industry but its most important and widespread application has been to eliminate freezing of surface connections in high-pressure wells; thousands of chokes have been run for this purpose. Other uses suggested for the tool when it was first introduced were the reduction of gas-oil ratios in wells, particularly as they approached the end of their flowing life, and to maintain flow in wells which have to be swabbed before they will kick off. In the K.M.A. pool in Wichita County, Texas, the chokes are being used for these purposes, especially gas-oil ratio control, on a fairly large scale at the present time. There are over 70 wells in the pool now equipped with bottom-hole chokes.

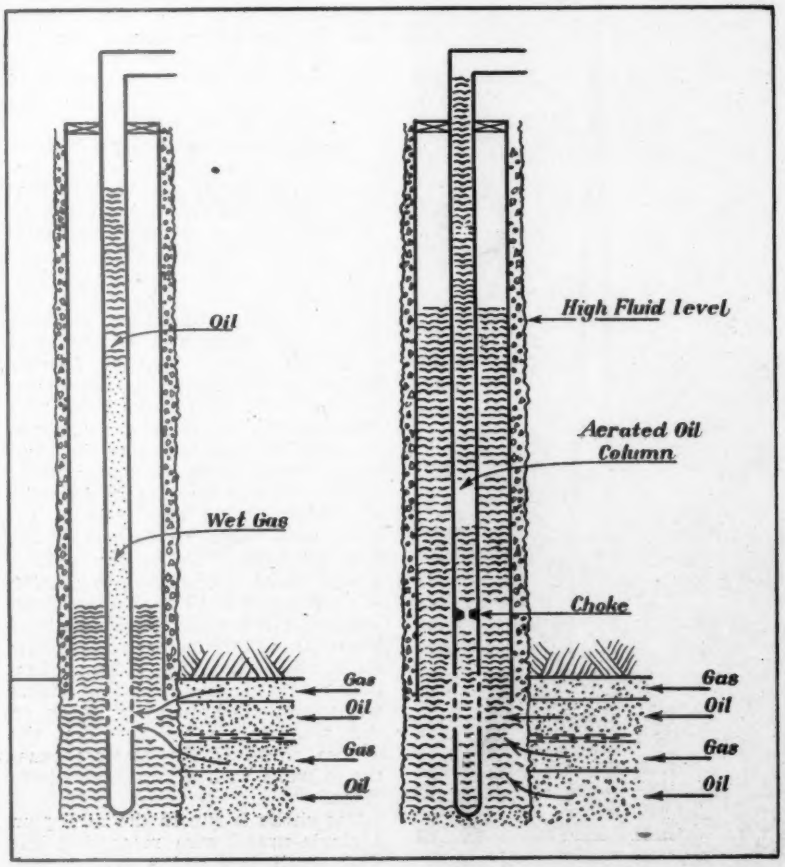


Fig. 1: Schematic drawings showing effect of running bottom-hole choke in well for gas/oil-ratio control. Left: Well without choke allows free entry of gas and by-passing of oil: fluid level falls and gas/oil ratio mounts. Right: Fluid level is maintained by choking and fluid seal shuts off upper gas zone and restricts entry of gas from lower zone into well

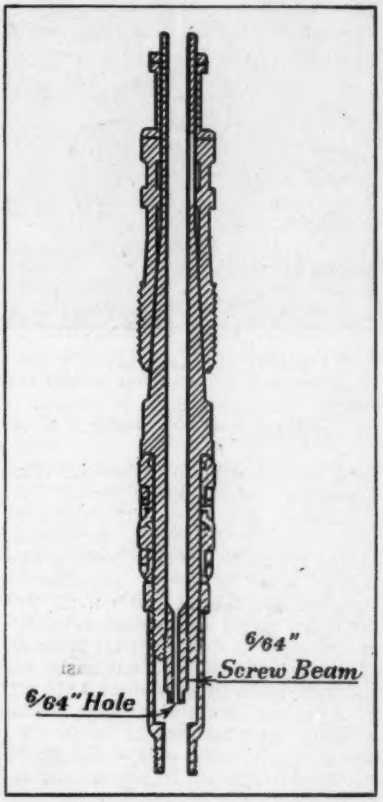
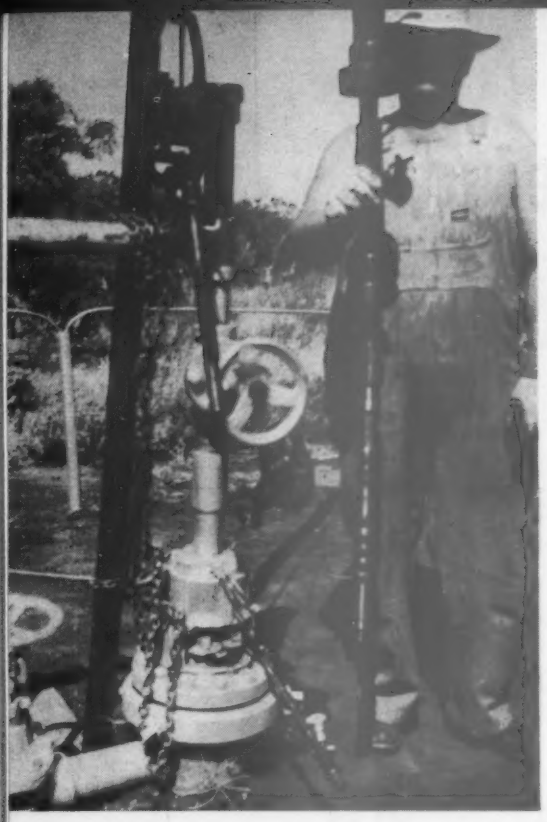


Fig. 2: Bottom-hole choke with screw-type bean such as is run in wells at K.M.A. To change the orifice size the choke can be pulled from the well and a new bean installed

This is not the first time the bottom-hole choke has been employed to reduce gas-oil ratios. In a field near Wellington, Kans., a number of chokes were installed to reduce gas-oil ratios in 1936 and satisfactorily accomplished the purpose. Some have been similarly used in fields in La-Salle Parish, Louisiana.

The situation at K.M.A. which led to the installation of the bottom-hole chokes was a gradual increase in the gas-oil ratio of some of the wells producing from the K.M.A. (Strawn)



Type B positive choke attached to a small set of jars and sinker bar for running into well in K.M.A. The choke is attached to the running-in tool with which it is set

sand topped at 3,750 to 3,800 ft. The allowable gas-oil ratio for K.M.A. sand wells is 2,000 cu. ft. per barrel and a penalty (reduction in allowable) is levied if this is exceeded. The K.M.A. sand is being repressured with an average of 620 cu. ft. per produced barrel of oil being returned to the sand, and the gas-oil ratio is, of course, figured on a net basis. An operator could thus produce 2,620 cu. ft. of gas per barrel of oil from a well without a reduction in allowable. However, since there is a charge of $0.025 per 1,000 cu. ft. returned, considerable money is saved by keeping the gas-oil ratio at a minimum.

Nonflowing Wells

An additional factor was the failure of a number of the wells to flow their allowable even with an excessive gas-oil ratio. The wells would flow oil a short time and then the gas would break through. Producing the wells for comparatively short periods at a time and having several flowing periods during the day was helpful but even then the allowable could not be produced. Installing bottom-hole chokes in such wells permitted them to be flowed over 24 hours with the allowable being obtained. In a well on a small lease it was impossible to get over 17 bbl. per day by intermittent flowing while after a bottom-hole choke was installed the well's allowable of 24 bbl. was produced over the 24-hour period.

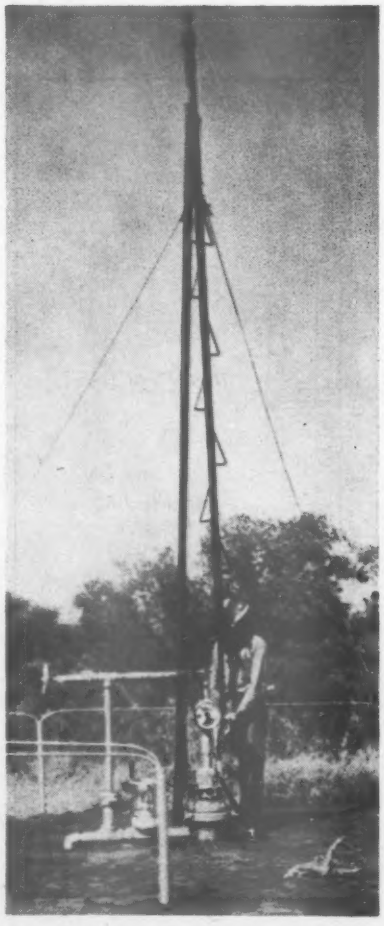
Although the field was discovered in 1931 most of the drilling to the K.M.A. sand took place during 1937 and 1938 but the field continued to develop until 1941, during which 137 wells were drilled. At the present time there are 868 wells flowing, 639 pumping and 102 gas input wells. Most of the pumping wells are in the north end of the field. The return of the gas to the formation has prolonged the flowing life of the wells and it is not being discontinued in the areas going on the pump. The average gas-oil ratio is 2,164 cu. ft. per bbl. of produced oil and the average production per well is 13.5 bbl. daily. The dissolved gas ranges from 750 to 850 cu. ft. per bbl. During May 417,000,000 cu. ft. of gas was returned to the sand.

The average static bottom-hole pressure as shown by tests in key wells is around 1,020 lb. per sq. in. at 2,600 ft. Shut-in well-head pressure is approximately 925 lb. per sq. in. The wells flow generally with 350-lb. pressure on the tubing.

The 30 ft. of pay is divided into two sections with the lower one having a little more gas than the upper. This is especially true if the wells have been cleaned out and shot. The sand is fairly tight although there are some streaks with fairly high permeability. If the wells have highly permeable streaks or have been shot and cleaned out they exhibit a higher gas-oil ratio.

The continuous recycling of the gas has a tendency to increase the gas-oil ratio particularly as the oil is forced out of the permeable zones and the gas can move through such zones more readily. The gas-oil contact is not sharp.

Tubing is run almost to the bottom of the wells and the perforations in it are generally located about 50 ft. from bottom. When bottom-hole chokes are installed they are generally placed about 45 or 50 ft. above the perforations.



Lubricator with stem and jars inside it being raised into position for attaching to the well head preparatory to running bottom-hole choke in well at K.M.A.

Action of Choke

The action of a bottom-hole choke when installed to control the gas-oil ratio is twofold: (1) A fluid seal is established by raising the fluid level in the well so that the gas cannot come out of the formation and bypass the oil, which is called breaking through; and (2) It permits the oil to be produced continuously as it enters the well bore. Gas coming into the well bore aerates the column of fluid and helps lift it to the surface. Practically a constant fluid level and bottom-hole pressure are maintained in the well.

The first step in running a bottom-hole choke is to determine the productivity index of the well so that the proper size choke bean can be selected. This, of course, necessitates determining the production of the well for different drops in the bottom-hole pressure. The charts obtained from bottom-hole pressure test at K.M.A. showed a very rapid drop during the ordinary flowing period thereby indicating that without the choke the oil was being produced much more rapidly than it was entering the well bore and the fluid level was dropping enough to allow the gas to break through. In the wells at K.M.A. chokes with 6/64-in. orifices were installed instead of an 8/64-in. bean; the larger orifices would have permitted production to be obtained in 10 to 12 hours flowing time but it might have permitted the breaking through of the gas while the smaller orifices allow the production to be obtained over 24 hours without break-through. A check on this reasoning is the fact that the chokes produced the greatest benefits in wells with a low productivity index.

The choke is run in the tubing on a single-strand wire measuring line with small jars and a setting tool. When the choke has arrived at the setting point the wire line is manipulated and the slips grip the interior of the tubing and hold it in place.

TABLE 1—PERFORMANCE OF BOTTOM-HOLE CHOKES AT K.M.A.

Well	Before Choke: Oil Production (Bbl.)	Before Choke: Gas-Oil Ratio	After Choke Installation: Oil Production (Bbl.)	After Choke Installation: Gas-Oil Ratio	Changes: Oil Production (Bbl.)	Changes: Gas-oil Ratio
A	14	3,150	23	2,310	+ 9	— 840
B	26	3,200	40	1,850	+14	—1,400
C	30	3,000	36	2,350	+ 6	— 650
D	25	3,350	36	2,450	+11	— 900
E	28	3,300	36	2,450	+ 8	— 950
F	30	3,250	40	2,340	+10	— 910

To pull the choke from the well it is only necessary to run in with a special socket, drive down to release the slips and pick up to retract them. The choke used at K.M.A. is of the positive type and it is necessary to change beans when it is desired to alter the orifice size.

Reactions of Wells

One well in which a choke was run had a gas-oil ratio of 3,200 cu. ft. per bbl. of oil and it was reduced to 1,850 cu. ft. per bbl. It flowed at this rate for over two weeks when it rose to 2,600 cu. ft. per bbl. due to a production drop from 40 to 30 bbl. per day. The tubing was partially clogged with paraffin and after this was cleaned out the production increased but the gas-oil ratio remained the same. The offsets to this well were being pumped.

Five other wells (data shown in the accompanying table) had gas-oil ratios of 3,000 cu. ft. per bbl. or over and it was impossible to obtain the allowable from them. Installation of 6/64-in. bottom-hole chokes in four of the wells dropped the gas-oil ratios to 2,000-2,500 cu. ft. per bbl. range and increased the production 6 to 11 bbl. per day. The remaining well, because of its lower productivity, was equipped with a 5/64-in. choke, but it also showed a gas-oil ratio decrease and a production increase.

Bottom-hole chokes have been used previously for reducing the water production or for prolonging the flowing life of wells which are going dead because of water encroachment. At K.M.A. attempts to use chokes for this purpose resulted successfully in an Ellenburger well but did not work out in a K.M.A.-sand well. The failure to reduce the water production and prolong flowing life in the K.M.A.-sand well is believed to be due to the fact that the water entered the well in rather large slugs instead of a small continuous flow.

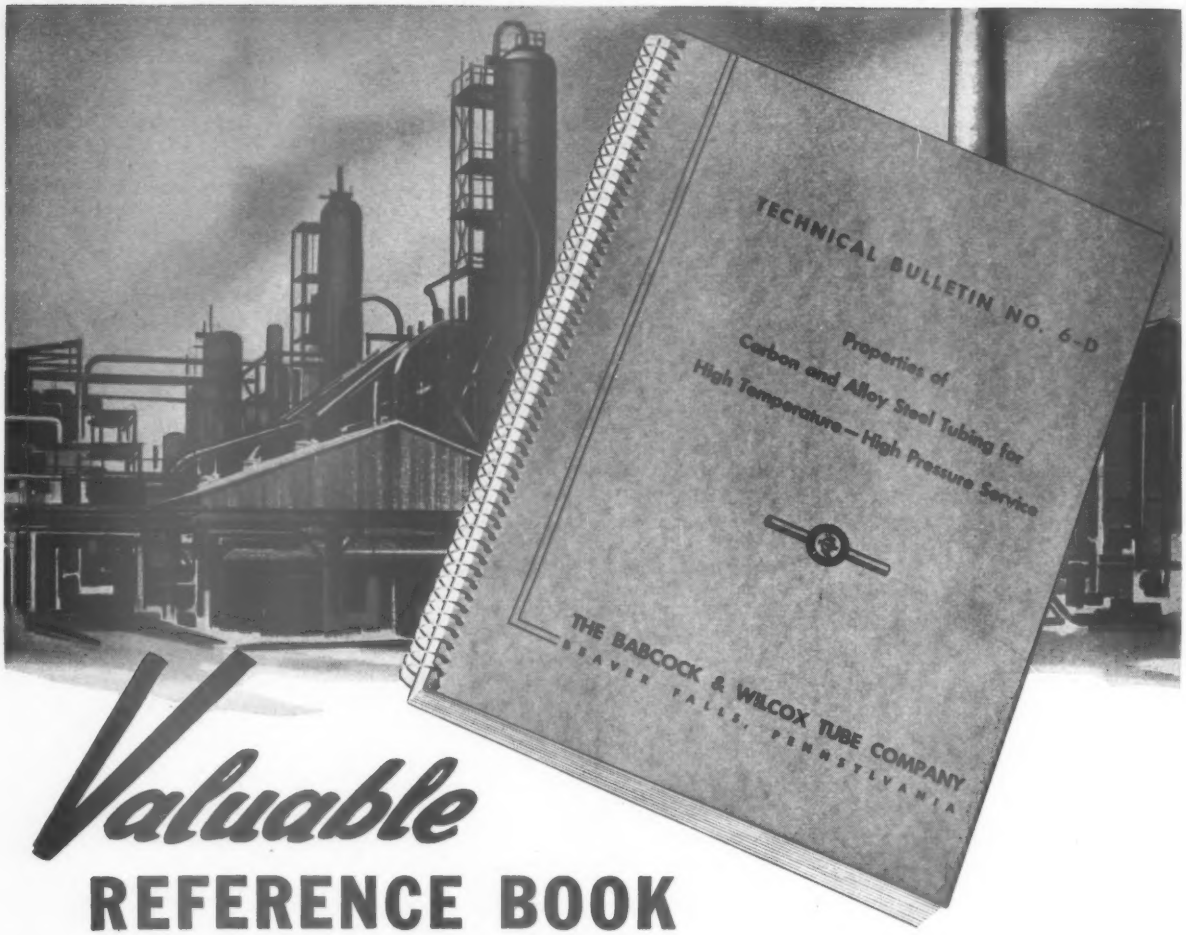
The Ellenburger well in which a choke was installed had a water cut of 15 per cent and it was necessary to swab it once a week to keep it flowing. A choke with an 8/64-in. bean was run and the well swabbed in after which it flowed 7 bbl. per hour. The well continued flowing for 1½ months but the water production increased to 25 per cent and the well went dead. Swabbed back into production the well flowed for a little over a week more when it reached 30 per cent water and pumping equipment had to be installed.

Success of bottom-hole chokes in maintaining flowing conditions in a well in the face of increasing gas and water production depends to a great extent on the reservoir characteristics. Both gas and water move more readily through the producing formation than oil does and consequently the objective is to restrict as much as possible the movement of the former two while enhancing the possibilities of the oil getting into the well bore. Where the gas-oil contact is well defined, it is possible to establish a fluid seal so that any gas entering the well must first pass through oil or force oil ahead of it. If the oil and gas are not segregated in the formation, or if there are alternate streaks producing gas and oil, the establishment of a fluid seal is difficult and flow benefits must come primarily from aeration of the fluid column and the maintenance of a constant bottom-hole pressure. The control of water is due to a maintenance of bottom-hole pressure and the constant removal of water as it enters the well.

Machine Tests Large Flanged Valves

A VALVE tester for testing large-size flanged valves was recently made in the machine shop of a large oil company. A three-legged table was built with a section of 12-in. pipe forming a pressure cylinder suspended from and welded to the table top. Three clamp bars pass through fulcrum loops, their outer ends sliding in grooves in extensions of the table; a three-legged spider, which connects to the piston in the cylinder, actuates the clamp bars. One or more heavy rubber gaskets with relatively small holes in their centers are above the open end of the main cylinder. The tester is operated by hydraulic or other power.

In operation, the valve is placed on the gaskets centered over the main cylinder, and water or air is turned into the clamp cylinder which pulls the three clamp bars down tight on the lower flange. Water pressure is turned into the large cylinder and thus against the closed valve, and the pressure raised to the maximum test pressure required. The leaks, if any, appear around the upper side of the gate valve, globe or plug, and the proper steps may be taken to stop them. An arrangement for similarly testing small screw-type valves consists of an open-end threaded pipe connected to the water supply or by means of a water line ending in a screw-type valve. To the outer end of the valve may be screwed reducer nipples ending in the desired size for any valve to be tested. In the unit shown, pressures up to 300 lb. are used.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SEAMLESS DIVISION **BEAVER FALLS, PA.**

Cracking Technology—No. 4

Cracking Recycle Stock

*by C. R. Wagner**

Higher temperatures and pressures are required to crack recycle stocks satisfactorily than are needed for virgin stock. Higher distillation rates reduce polymerization of cracked products in the still, since longer exposure of cracked products to cracking conditions causes formation of molecules which can better resist these conditions without decomposition.

IN the first commercial cracking units the operations were conducted batch-wise, or at best in a semicontinuous manner. This could be done at the low temperatures and pressures employed, which, it should be emphasized, were quite well adapted to the manufacture of the product desired. The expression "octane number" had not been coined at that time and very few technically trained people appreciated the fact that the quality of the gasoline used had any effect upon the performance of the automobile engine excepting, of course, starting and crankcase dilution. Everyone wanted to make more gasoline from crude petoleum, but wanted the additional yield to have the same qualities, particularly gravity, color and odor, as the natural product.

*Consultant in refining technology.

Experimental work under such conditions was much easier and cheaper than when attempting to improve modern continuous-type units which operate at 600 to 1,000 lb. per sq. in. and at temperatures of about 1,000° F. Except for the deductions concerning the speed of the reaction and the secondary reactions which often completely cover up the primary reactions, many of those drawn from this early work are valid under today's conditions, however.

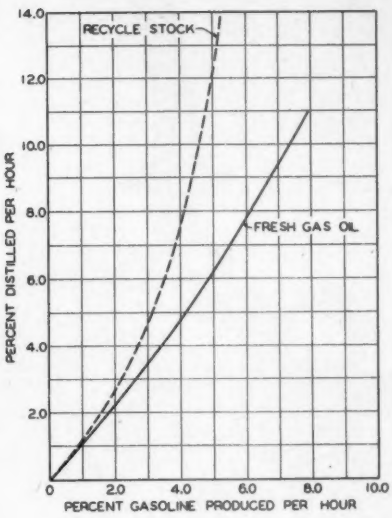


Fig. 1

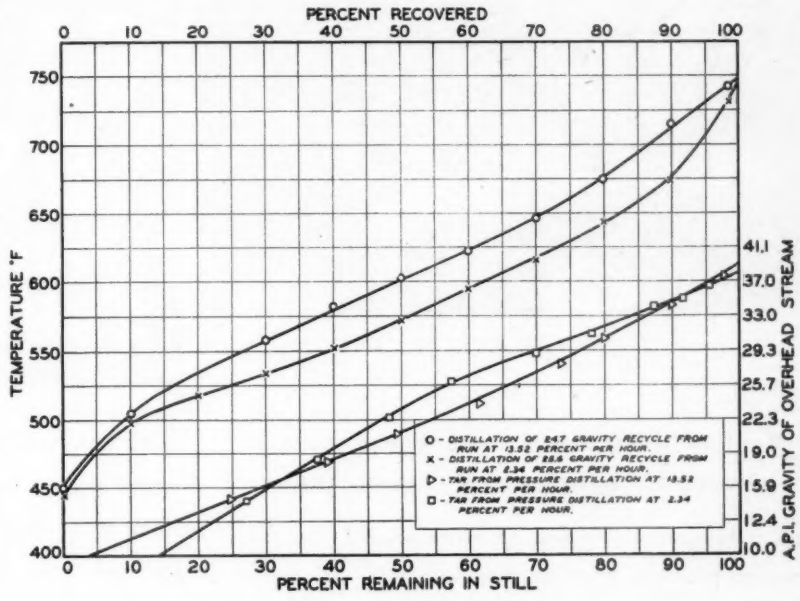

PERCENT RECOVERED
TEMPERATURE °F
PERCENT REMAINING IN STILL
A.P.I. GRAVITY OF OVERHEAD STREAM
O - DISTILLATION OF 24.7 GRAVITY RECYCLE FROM RUN AT 13.52 PERCENT PER HOUR.
X - DISTILLATION OF 28.6 GRAVITY RECYCLE FROM RUN AT 6.34 PERCENT PER HOUR.
▷ - TAR FROM PRESSURE DISTILLATION AT 13.52 PERCENT PER HOUR.
□ - TAR FROM PRESSURE DISTILLATION AT 2.34 PERCENT PER HOUR.

Fig. 2

TABLE 1

	Charging stocks			Charging stocks	
	Fresh gas oil	Recycle stock		Fresh gas oil	Recycle stock
Gravity, °A.P.I.	33.1	24.7	50	550	553
Initial, °F.	506	506	60	558	562
10 per cent recovered	523	522	70	566	573
20	529	535	80	580	585
30	535	540	90	600	620
40	540	547	End point	640	668

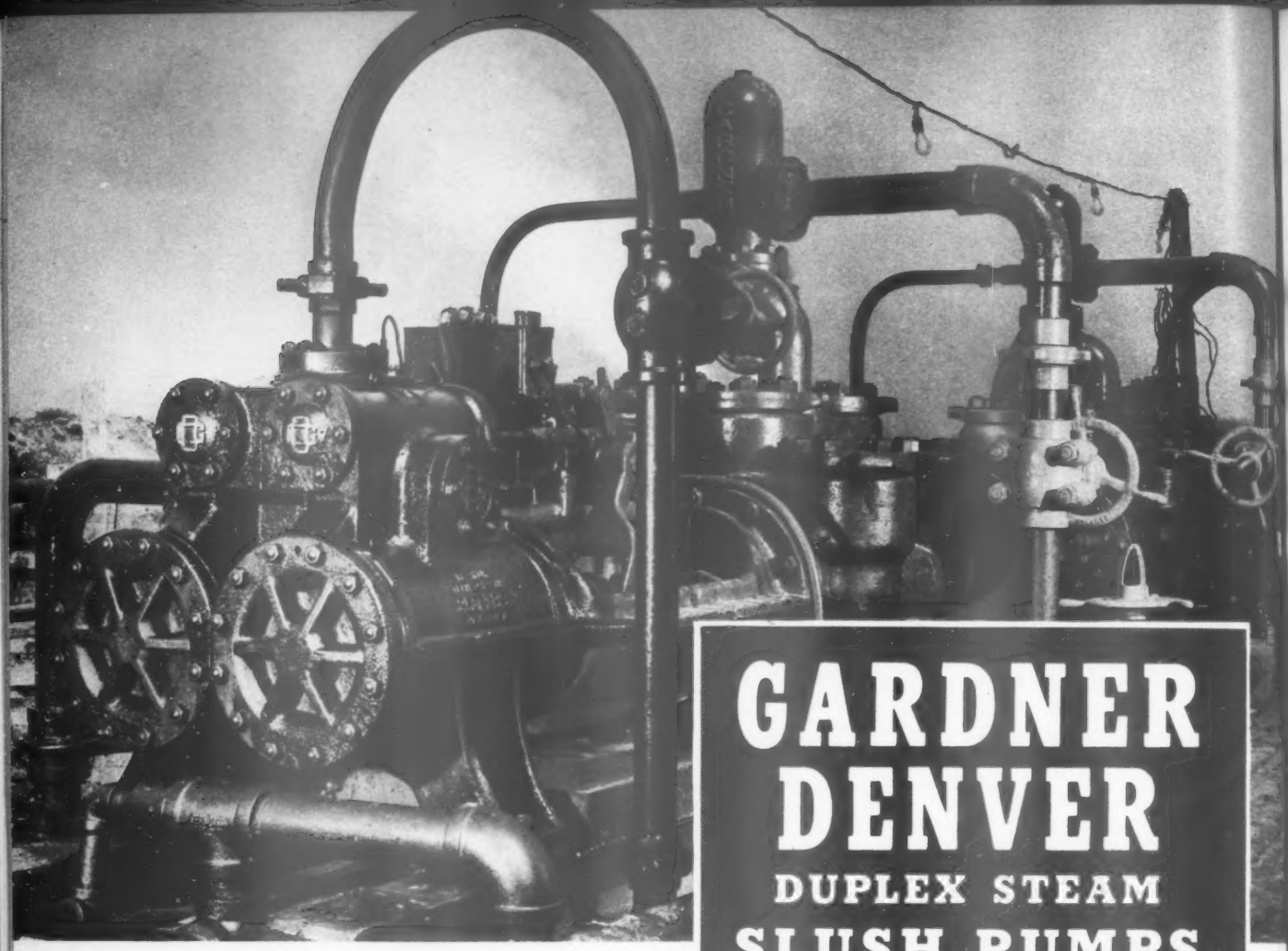
Runs Made on Fresh Gas Oil

	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6
Vol. per cent distilled per hour	1.18	1.96	2.39	3.77	6.25	8.35
Total per cent distillate made	51.20	40.20	53.70	49.00	53.10	50.10
Total per cent gasoline* made	58.50	37.60	48.40	41.90	41.10	39.40
A.P.I. gravity of tar	20.70	23.70	20.20	24.50	23.30	26.50
Cracking temp. range, °F.	750-757	755-763	754-774	758-772	746-785	751-779
Vol. per cent distilled per hour	1.23	1.63	2.16	4.38	5.54	12.60
Total per cent distillate made	49.70	40.00	45.30	54.70	52.60	50.40
Total per cent gasoline* made	40.00	33.00	39.40	38.30	30.50	20.50
A.P.I. gravity of tar	14.80	8.20	6.70	8.10	4.40	15.20
Cracking temp. range, °F.	765-780	773-780	768-781	776-797	780-795	784-806

*Per cent at 400° F. on A.S.T.M. distillation taken as gasoline content.

Data contained in Table 1 and Fig. 1 were obtained by the pressure distillation at 95 lb. per sq. in. of two charging stocks of the same boiling range but different chemical composition. The one stock was a straight-run gas oil from Mid-Continent pipeline crude, the other was a recycle stock recovered from 95 lb. per sq. in. pressure-still tar where the pressure stills were charged with gas oil from the same crude. Except for quality of charging stock all conditions were as nearly identical as possible for the 12 runs reported.

It is worthy of note that the recycle material required a much higher temperature than the fresh gas oil, and that an inerease in distillation rate,



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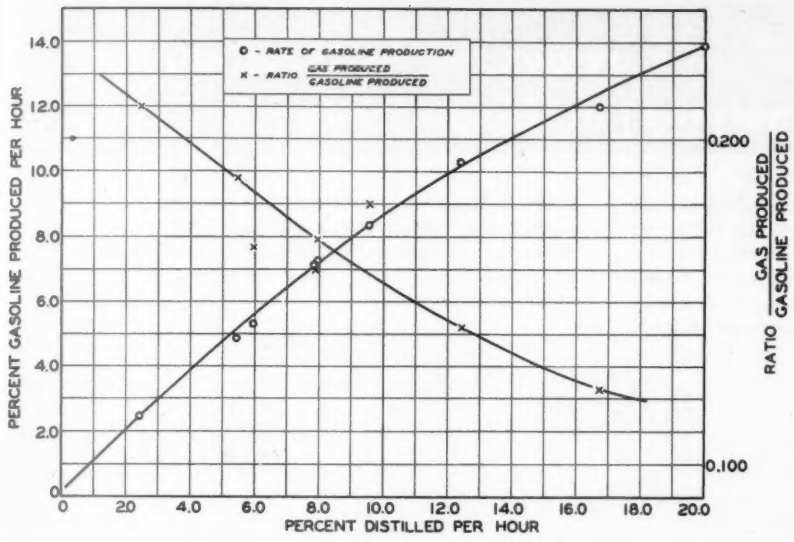
O - RATE OF GASOLINE PRODUCTION
X - RATIO GAS PRODUCED / GASOLINE PRODUCED
PERCENT GASOLINE PRODUCED PER HOUR
PERCENT DISTILLED PER HOUR
RATIO GAS PRODUCED / GASOLINE PRODUCED
0.200
0.100

Fig. 3

at least on the fresh gas oil, resulted in decreased polymerization of the tar. This point is somewhat better illustrated by the data shown in Fig. 2. In this curve are shown the distillation ranges and gravity relationships of two samples of recycle stock obtained by fire and steam reduction of pressure tars; the one tar was produced by a slow-pressure distillation of paraffin distillate from Mid-Continent crude, while the other was produced by a rapid-pressure distillation of the same charging stock. The upper curves showing the distillations on the recycle stocks confirm the theory that cracking at the slow rate of distillation is more rapid than the distillation would indicate, and that rearrangements are therefore occurring which will enable the material left in the still to resist further treatment at the same temperature. The lower curves illustrate rather convincingly that polymerization has occurred to a much greater extent in the run at 2.34 per cent per hour, which run of course subjected the oil in the still to cracking conditions for a longer period of time.

Rate of Gasoline Formation

In Fig. 3 are given data on the rate of gasoline formation as related to total distillation rate and the ratio of gas production to gasoline made when cracking this same paraffin distillate under 95 lb. per sq. in. in the same equipment as was used in the previously described experiments. The still was a piece of 12-in. pipe 24 in. long set in a brick setting and heavily insulated. A 2-in. insulated vapor line led to a 4 by 48-in. dephlegmating column which contained no packing. The material condensed in this dephlegmator ran back to the still.

(Continued on page 53)

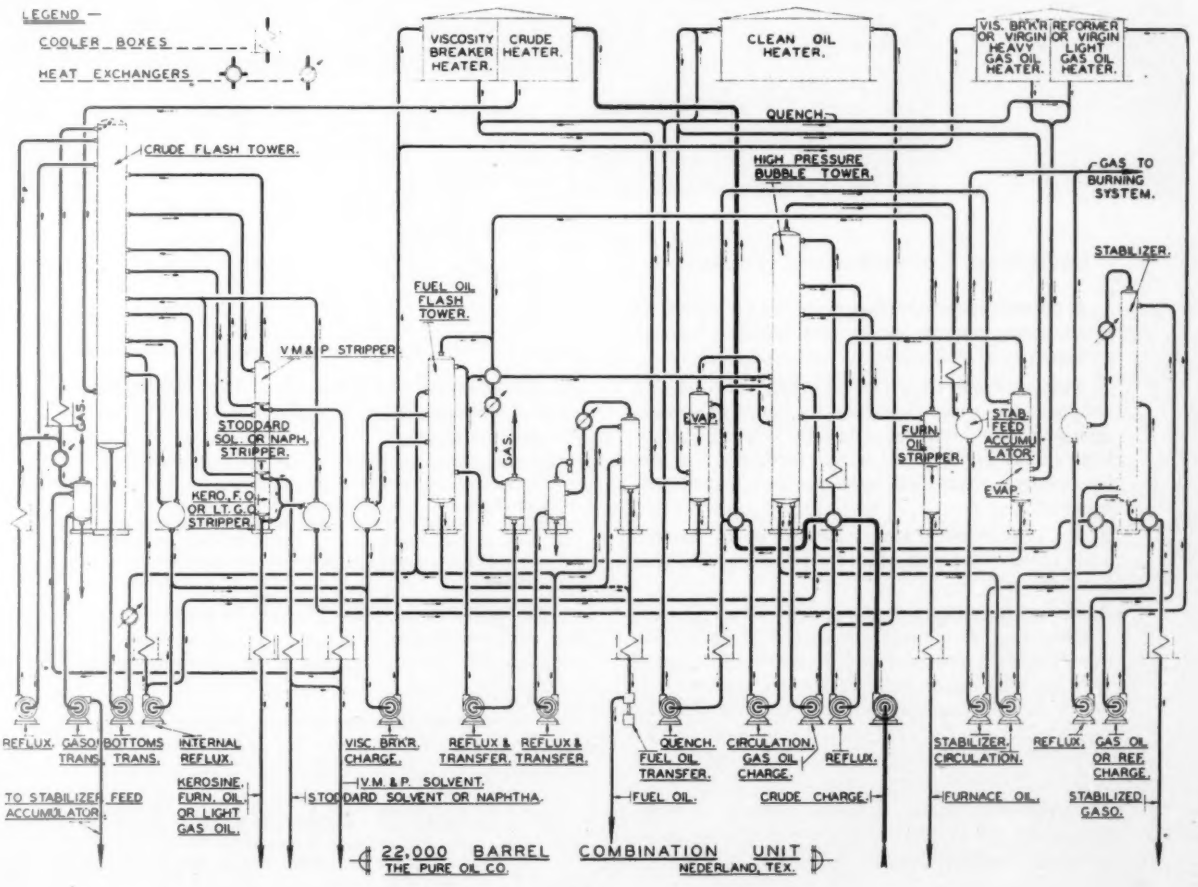

Fig. 4

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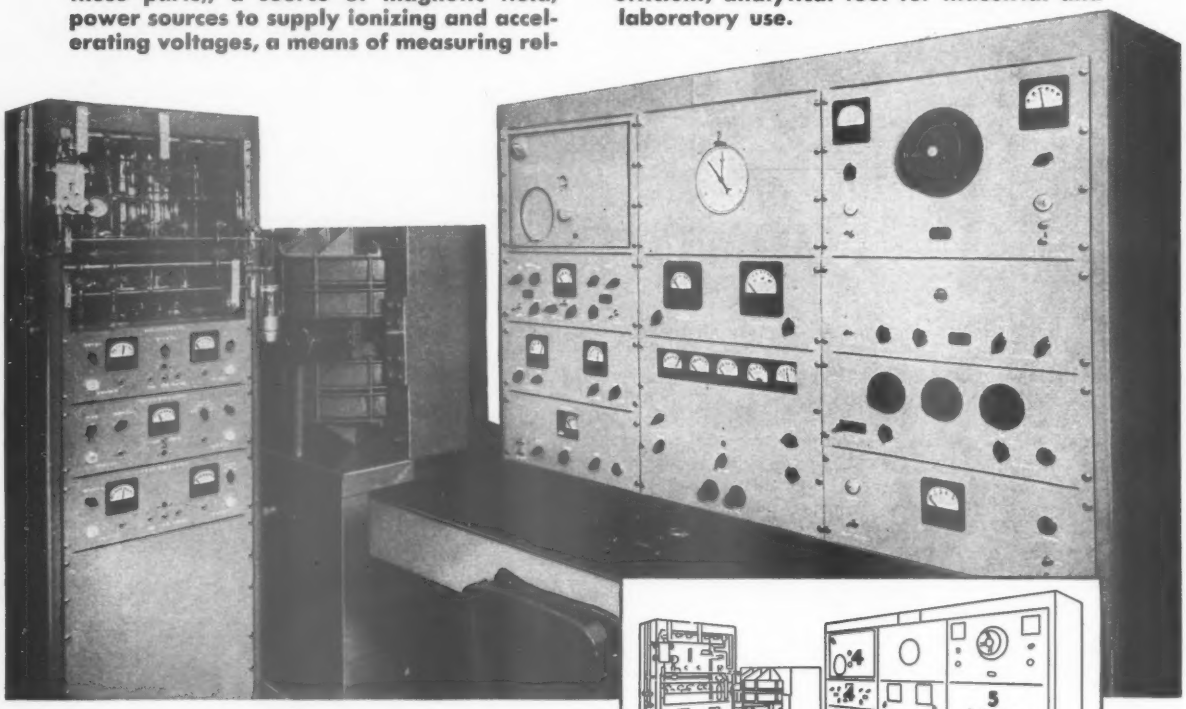

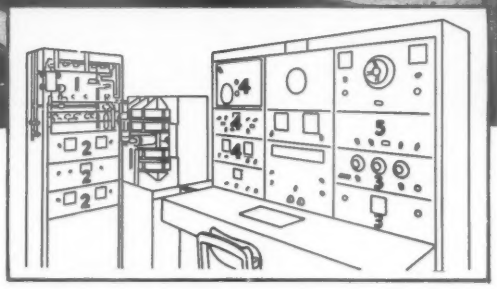

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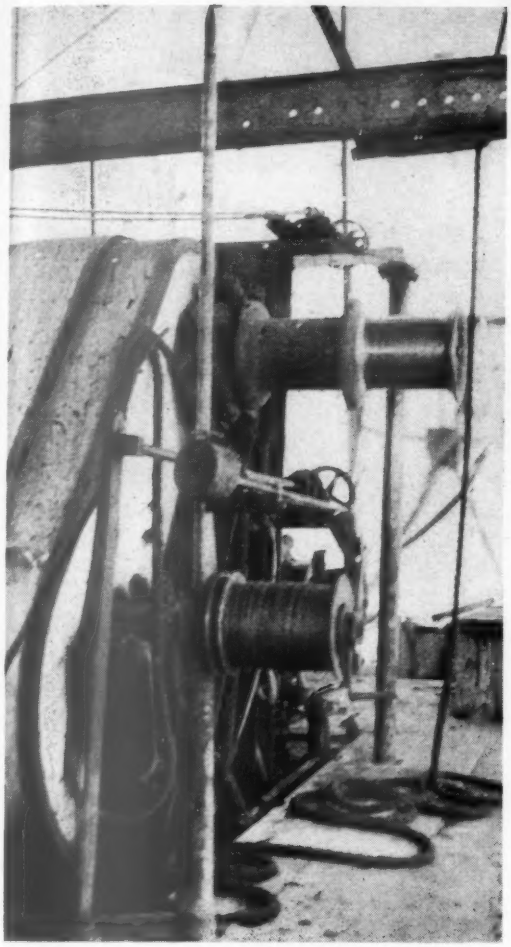
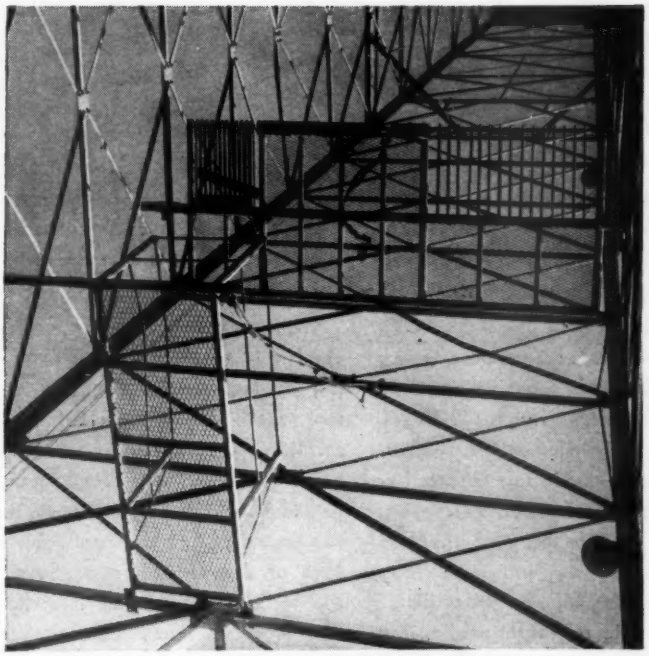


Measuring Line Reel Mounting

A CONVENIENT arrangement for mounting and operating the measuring line has been devised by a California drilling contractor. As a footing or socket for the standard which carries the measuring reel, a half collar is welded to the sill of the draw works. The reel standard is made of a convenient length of 2-in. pipe, the lower end of which is threaded to engage the half collar. As the shaft which supports the reel is attached horizontally to the outside of the 2-in. standard, the direction finder can be placed in the pipe where it can be obtained readily when running a hole survey.



Safe Working Platforms in Derrick

COMPLETE facilities for safe performing of the servicing-crew derrick man's work are provided by these platforms in a derrick over a 6,500-ft. well. The platforms are hinged and are made with angle-iron and tubular steel frames and expanded metal floors. Upper platform has hayrakes for racking rods and tubing and a notch in the front member of the frame where a stand of tubing may rest while the derrick man swings the traveling block. The lower platform is used by the derrick man while swabbing the well through a lubricator, etc. As there is a rail around it, no safety belt is needed while tightening the oil saver or performing other tasks.

Trailer for Tubing Tools Pulled by Tractor

SOME companies use light trucks for hauling rod and tubing equipment from one well to another but this operator has designed a four-wheel trailer which can be pulled by the double-drum winch tractor. Tool boxes on each side are provided for the light hand tools and between them there is space for the elevators, spider, blocks, etc. There is also room for the rod hangers and other equipment.

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Oil-Well Pumping Practices—No. 14

COUNTERBALANCING—

Purpose and Principles

by J. Zaba

This article consists of a discussion of the theoretical concept of effective counterbalancing. In subsequent articles, the effect of factors modifying the theoretical optimum will be taken up. This series began in the July 1 issue of the Journal.

DISCUSSION, in the preceding chapters of this series, of the subsurface portion of a sucker-rod pumping installation dealt primarily with loads, forces and motions involved. Consideration, starting with this installment, of the surface equipment of a unit pumping installation will be centered around power, work and other related phenomena. A brief summary, at this point, of definitions of terms to be used should be helpful

Definitions

Work is product of weight and distance. When a force F moves a body over a distance S it performs work W and $W = F \times S$. With force expressed in pounds and distance in feet the work is given in foot-pounds.

Energy is ability to do work. Energy stored in counterbalance during the downstroke of the pumping cycle performs work in helping to lift the load of fluid and rods during the upstroke.

Power is rate of doing work. $P = W/T$ where P denotes power needed to perform, at a constant rate. work W in time T. The average, or constant, velocity V equals distance S divided by time T, therefore

$$P = \frac{W}{T} = \frac{F \times S}{T} = F \times V.$$

Practical unit of mechanical power is horsepower or power necessary to lift 33,000 lb. 1 ft. in 1 minute.

Torque is a measure of force tending to produce rotation and is a product of force and arm of leverage. With force expressed in pounds and arm of leverage in inches the torque is usually measured in inch-pounds. The relation between torque tending to produce rotation of a shaft and power transmitted by the shaft is expressed by the formula:

$$T = \frac{63{,}025 \times H.P.}{N}$$

where

T = torque (in.-lb.)
HP = horsepower
N = R.P.M. of the shaft.

Counterbalancing

For the purpose of this series the surface equipment of a unit pumping installation will be divided into three groups, as follows: (1) The equipment which transforms the rotating motion of the crank into the reciprocating motion of the polished rod, together with structural members needed for its support. This equipment includes walking beam, samson post, pitman and others together with necessary bearings. (2) Transmission and reduction unit which transmits the power from the prime mover reducing, at the same time, the speed to the desired speed of the pumping cycle. (3) The prime mover which furnishes the power. Since the operation of the surface pumping equipment is very decidedly affected by the manner and degree of counterbalancing it is necessary, at this point, to discuss briefly the general principles and purposes of counterbalancing. More detailed discussion of counterbalancing of unit pumping installations and of central pumping powers, will be introduced, in proper sequence, in later installments. At present only general aspects of counterbalancing will be considered as an introduction to discussion of the surface pumping equipment.

Practically all of the work of lifting the fluid by a sucker-rod pump is performed during the upstroke part of the pumping cycle. During this phase of the cycle full load of oil and sucker rods must be accelerated upward from zero velocity, and must be lifted the length of the stroke of the pump. On the downstroke with load of fluid transferred to tubing, the sucker-rod load becomes negative and the falling rods act as a driving force for the installation. If some means were not provided to equalize these loads, conditions highly detrimental to the surface pumping equipment would result. From the standpoint of the prime mover unnecessarily high demand for power would occur during the upstroke, with the prime mover idling or actually being driven during the downstroke. This would cause the prime mover to slow down on the upstroke and speed up and run away on the downstroke. From the standpoint of transmission unnecessarily high torque would be imposed during the upstroke. Counterbalancing provides for even distribution of loads and for reduction of peak horsepower and peak torque. The counterbalance weights store the energy during the downstroke, when the power demand is low and release this energy during the upstroke performing part of the work of lifting fluid and rods.

Proper counterbalancing is probably one single feature in the surface pumping equipment which contributes more than any other to the proper operation of the whole pumping installation. In selecting new equipment assurance that the well will be properly counterbalanced permits selection of smaller transmission and prime mover. In case of installation already in operation maintaining of proper counterbalance reduces the troubles experienced and prolongs the life of the equipment.

Actual and Effective Counterbalance

In discussion of counterbalancing differentiation must be made between actual and effective counterbalance. Actual counterbalance is actual load of counterbalance weights used. The effective counterbalance is the counterbalancing result which the weights exert. This result is a function of the position of weights in relation to the points of leverage and, in case of beam counterbalance of a unit installation, also a function of speed of operation.

Taking into consideration a unit installation with a beam counterbalance the effective counterbalance depends on the point the weights are placed on the beam. For instance, if the weights are placed between pitman bearing and samson post the effective counterbalance is less than the actual counterbalance. The ratio of decrease will depend on ratio of arms of leverage from the pitman bearing to the samson post and from the center of gravity of the weights to the samson post. If the weights are placed on the extension of the beam, beyond the pitman bearing, the effective counterbalance is, of course, larger than the actual counterbalance. In case of rotary counterbalance the ratio between actual and

effective counterbalance depends on the radius of gyration of the center of gravity of the weights.

In case of a beam counterbalance the effective counterbalance depends also on speed of operation[1,2]. For constant speed of operation the effective counterbalance of a rotary counterbalance is independent of the operating speed. In case of a beam counterbalance, however, changes in speed affect the rate of acceleration and deceleration of the mass of weights which results in change of effective counterbalance. These changes can be expressed by formula:

$$C_e = C \pm \frac{C}{g} a$$

where

C_e = effective counterbalance, (lb.)
C = actual counterbalance, (lb.)
g = acceleration of gravity (32 ft./sec.^{2})
a = vertical acceleration (ft./sec.^{2})

An ideal effective counterbalance should equal the load consisting of weight of rods plus half of the weight of fluid. Under such arrangement the net load during the upstroke equals the polished rod load less the counterbalance load. Since the static polished rod load consists of weight of rods plus weight of fluid the net load equals half of the weight of fluid. On the downstroke the net load equals the counterbalance load less the weight of the falling rods or again the weight of half of the fluid. The net loads in both parts of the stroke are equal.

To illustrate assume a well with a polished rod load of 11,000 lb., this load consisting of 8,000 lb. sucker rod load and 3,000 lb. fluid load. Without counterbalance this total load of 11,000 lb. would have to be lifted on the upstroke. On the downstroke the 8,000 lb. weight of falling sucker rods would become negative and would actually drive the prime mover. An ideal counterbalance for such a case would equal weight of rods plus half weight of fluid or 8,000 + 3,000/2 = 9,500 lb. With such a counterbalance the net load during the upstroke would equal the polished rod load less counterbalance or 11,000 — 9,500 = 1,500 lb. On the downstroke the net load equals the counterbalance less the weight of rods or 9,500 — 8,000 = 1,500 lb.

The effect of an unbalanced and properly balanced well load in creating torque on the transmission is shown in Fig. 1. The torque curves

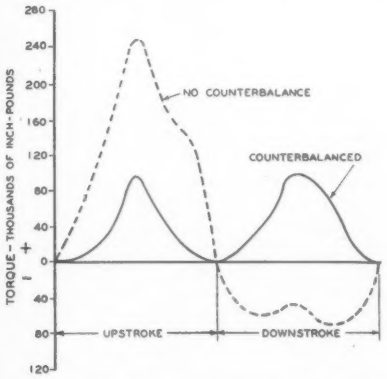

Fig. 1—Effect of counterbalance on torque

were calculated[3] from a hypothetical dynamometer card for a well operating with a 48-in. stroke. The card used was of the third order showing the peak load of 9,200 lb. and the minimum load of 2,000 lb. Both the maximum and minimum loads were approximately in the center of the card, which was reasonably flat. For card of this type the effective counterbalance may be calculated by taking half of the sum of the upstroke and downstroke loads at the middle of the card. For the card used this counterbalance amounted to 5,600 lb.

To calculate the torque formulas was used:

$$T = (W - C_e) R \sin O$$

where

T = torque (in.-lb.)
W = well load (lb.)
C_e = effective counterbalance (lb.)
R = crank radius (half of stroke) (in.)
O = angle between instantaneous crank position and position of crank at bottom of stroke.

HERE'S ONE ROD PACKING THAT WON'T WEAR OUT IN A HURRY...
JM
• With virtually the entire production of J-M Packings and Gaskets needed for war, delivery on other than high-priority orders may be slower than in normal times. However, through increased capacity and round-the-clock production, every step is being taken to assure the fastest delivery possible under the present emergency.

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For continued efficient service against high-pressure steam, you can't beat this rugged rod and plunger packing.

Its unique folded construction provides natural resiliency and forms a reservoir for the preserving lubricant, keeping the packing pliable in service.

Additional resiliency is provided by a rubber expansion back in the center block. And resistance to wear is assured by a double wrapping of asbestos cloth.

You can use Kearsarge Rod Packing, together with other packings and gaskets in the complete Johns-Manville line, to minimize equipment shut-downs . . . save much of the expense and loss of production caused by too-frequent re-packing. For details, ask for the new J-M Packing Catalog, Johns-Manville, 22 East 40th St., New York 16, N. Y.

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This formula, which is approximate, assumes uniform motion of the crank and vertical load at the wrist pin.

In using the formula the loadings were secured from the dynamometer card for different positions of the crank using 15-degree intervals. These values were then substituted together with corresponding values for sin O. Two curves were constructed, one for $C_c = O$ and one for $C = 5{,}600$ lb.

In comparing the two curves it should be noted that for well with no counterbalance the peak torque is nearly three times as high as for properly counterbalanced well. Furthermore when no counterbalance is used the torque ranges from the maximum of + 241,000 in.-lb. on the upstroke to the minimum of — 64,000 in.-lb. on the downstroke. For properly counterbalanced well the peak torques are practically equal, being + 91,000 in.-lb. and + 91,200 in.-lb. for the upstroke and downstroke, respectively.

While the theoretical concept of counterbalance as equal to the weight of rods plus half the weight of fluid is simple, in actual practice there are so many different factors which enter into consideration that in most cases accurate calculations of counterbalance is entirely impossible. The factors involved can be divided into two groups. To the first group would belong the intrinsic characteristics of the pumping cycle, the speeds and the loadings involved, the characteristics of design of the pumping mechanism and the characteristics of the prime mover used. To the other group would belong changing well characteristics such as gas and water conditions. Design of surface pumping equipment must take into consideration the fact that an installation, although originally well counterbalanced will have to work from time to time under over or under-counterbalanced conditions.

Because of the importance of the counterbalance to the proper operation of the installation methods have been devised for checking the counterbalance conditions of pumping wells. These methods will be reviewed later in this series when counterbalancing of a unit installation is considered in more detail.

Bibliography

1. Kenneth N. Mills: "A Comparison of Rotary, Beam and Pneumatic Counterbalances," Petroleum Engineer, May 1939, p. 42.
2. Emory N. Kemler: "Fundamentals of Counterbalancing," Petroleum Engineer, May 1936, p. 35.
3. Emory N. Kemler: "Calculation of Actual and Effective Counterbalance," Oil Weekly, Feb. 8, 1943, p. 17.

Cracking Recycle Stock

(Continued from page 47)

The tests on the paraffin distillate used as charging stock were as follows:

A.P.I. gravity	29.7
Initial, °F.	324
10 per cent recovered	519
20	569
30	596
40	624
50	648
60	678
70	696
80	723
90	750

Experiments under modern conditions on fresh gas-oil cuts from crude petroleum would have only limited value, however, as may be quickly seen by examination of the flow sheet of a modern combination unit such as that found in Fig. 4. Each of the several coils receives a mixture of fresh and recycle stocks, and some of these stocks contain considerable heavy gasoline. Due to the high pressure at which the fractionating towers operate it is practically impossible to strip all of the gasoline out of the recycle cuts without taking these sidestreams to stripping columns operating at low pressure. Such a procedure would involve additional expenditures for towers, condensers and power for pumping unless the unit were designed to take care of this operation in the first place. Even then first cost would be greater than for a unit designed to operate at higher pressure. A compromise with fractionating towers operating at slightly over 100 lb. per sq. in. gage pressure is probably the most desirable arrangement.

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DOG HOUSE STYLE

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Their opinion, *based on working performance alone, is the very last word. The fact that Spang Extreme Line Casing has been approved in hundreds of Dog House discussions is the finest acceptance that this product could have.

*FIELD ADVANTAGES OF SPANG EXTREME LINE CASING

HANDLING IN DERRICK:

1. Easy to stab and cannot be cross threaded.
2. When stabbed requires only 5 to 7 revolutions with spinning line (one pull on the cathead) and less than one turn (4 to 8 jerks) with the tongs.
3. End to shoulder contact insures proper makeup—cannot be harmfully overtonged (except intentionally).
4. Can be run at rate of 1,000 feet to 1,500 feet per hour, in range 3, as compared with 600 feet to 900 feet per hour for same range threaded and coupled casing.
5. Can be broken out and rerun with no rejections from galling or other injuries short of accidental denting.
6. Fluid seal protected by extending reinforcing ring.

LEAK RESISTANCE

100%—Pipe will collapse from external pressure or will expand beyond yield point from internal pressure without leakage at the joint; even when the pipe is subjected to heavy loads in bending or tension.

STREAMLINED

(*Advantages over threaded and coupled*)

1. No shoulders to hang-up on projections in the hole, or to scrape mud seal from walls of the hole.
2. Low friction in running in or out of hole.
3. Requires less pressure, after setting, to "break circulation."
4. Smoother flow of cement and, therefore, greater certainty of a good job of cementing.
5. Can be run against pressure through packing.

WASHOVER PIPE

On account of very high torsional strength this joint is ideal for use in washing over stuck pipe and may be run and rerun many times.

DRILLING CASING

Extreme Line Casing designed with slightly greater diameter at the joint, to increase joint efficiency and to give still greater resistance to torsion can be rotated in a manner similar to drill pipe.

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QUESTIONS on TECHNOLOGY

by W. L. Nelson

Loss in Temperature Of Stack Gases

Can you give us the details of how you obtained the information in Fig. 2 of your recent article on Stack Design? It seems that the temperature loss of the gases should be larger.—L. M. N.

The cooling of flue gases as they flow through a stack or chimney is an exceedingly complicated phenomenon. Under ordinary conditions, such as dry weather and a moderate wind, the data given in Fig. 2 of the Technical Questions item are about correct, but in a driving rain or in extremely cold weather, the gases might be cooled to a greater degree in chimneys than indicated in Fig. 2. In order to clarify the situation, as completely as possible, discussions and equations of the relation between the various variables that are involved and a revised figure similar to Fig. 2 of the issue of September 16, 1943, page 67, will be presented.

Fundamentally, the heat lost from the gases is equal to the heat transferred or radiated from the stack (or chimney) to the surrounding air. The heat lost from the gases is relatively straight-forward and may be formulated thus:

$$Q = 3{,}600V \times \frac{520}{540 \times 460} \times \frac{30}{379}(T_1 - T_2)\,0.26 = 37V(T_1 - T_2)$$

in which

- Q = heat lost, B.t.u. per hour
- V = volume of flue gas, cu. ft. per sec.
- T_1 = inlet temperature, °F.
- T_2 = outlet temperature, °F.

Only one assumption or simplification is involved in this statement, i.e., the average flue gas temperature was assumed to be 540° F.

The loss of heat in terms of the transfer rates and radiation from the surface of the stack is much more complicated. Inasmuch as radiation is a fourth power function of temperature, an attempt was made to evaluate the magnitude of the heat lost by radiation as compared with the heat lost by convection (or conduction). It was found that the radiation loss was about equal to the other heat losses, being small at stack-wall temperatures up to 400° F., about equal from 400° to 600° F., and large at temperatures above 600° F. Heat loss by transfer through the stack (or chimney) wall may be described thus:

$$Q_c = UA\,\frac{(T_1 - T_A) + (T_2 - T_A)}{2} = UA\,\frac{(T_1 - T_2)}{2} + UAT_A$$

in which

- Q_c = heat loss by convection transfer
- U = over-all heat transfer rate, B.t.u. per sq. ft.-hr.-°F.
- A = stack surface, sq. ft.
- T_A = temperature of air, °F.

In using this equation, the second term (involving T_A) was neglected in the mathematical derivation. Nevertheless, after having completed the derivation it is possible to use the derived values of T_1 and T_2 as if they were $(T_1 - T_A)$ and $(T_2 - T_A)$ as in the figure on this page, somewhat correcting the error caused by this assumption.

The value of U is composed of the gas film transfer rate on the inside of the stack (or chimney), the resistance of the metal or mortar wall, and the film transfer on the outside of the wall. The inside film rate is rather small even at high velocities (about 1.4), the resistance of the wall is negligible in the case of stacks, but for chimneys it is the major factor, and the outside film rate is very large (about 20) in case of a driving rain, so large that it might be neglected. The values of U for stacks and chimneys are about as follows:

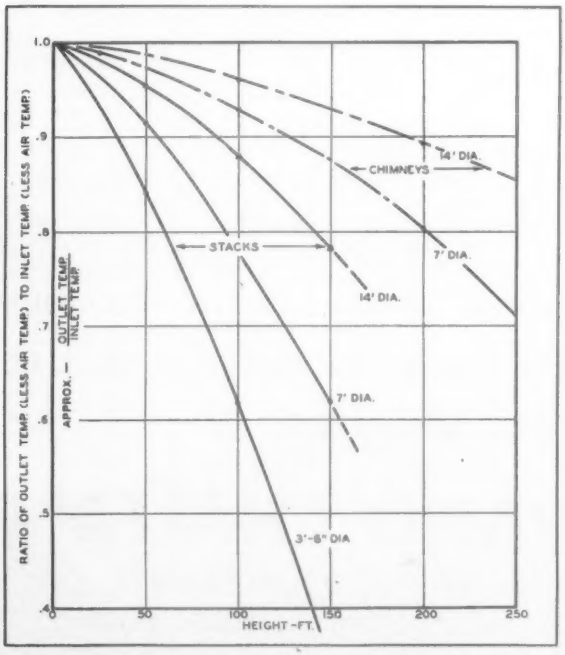
$$U\,(\text{stacks}) = \frac{1}{\frac{1}{1.4} + \frac{1}{20}} = 1.3$$

$$U\,(\text{chimneys}) = \frac{1}{\frac{1}{1.4} + \frac{1.5}{0.53 \times 1} + \frac{1}{20}} = 0.278$$

The value of area (A) can be described in terms of volume handled (V) by assuming an average velocity of 16 ft. per second.

$$A = H\sqrt{\frac{V}{16} \times \frac{4}{3.142}}\,(3.1416) = 0.89\sqrt{V}\,H\ (\text{stacks})$$

(Continued on page 62)

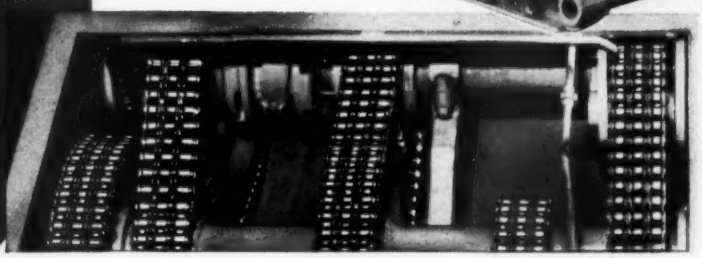


Approximate temperature losses in stacks and chimneys

Unit Rig 3-engine Model U-10 with 6-speed Diamond Roller Chain Transmission.

ON EQUIPMENT SO VITAL TO OIL PRODUCTION

DIAMOND ROLLER CHAINS ARE REGULARLY USED



Above: View showing portion of the compact transmission assembly of Model U-10 rig, the design of which incorporates triple-strand Diamond Roller Chains.

Motorig, self-propelled by the drilling engines from the Diamond Chain driven compound. This rig is for slim hole drilling.

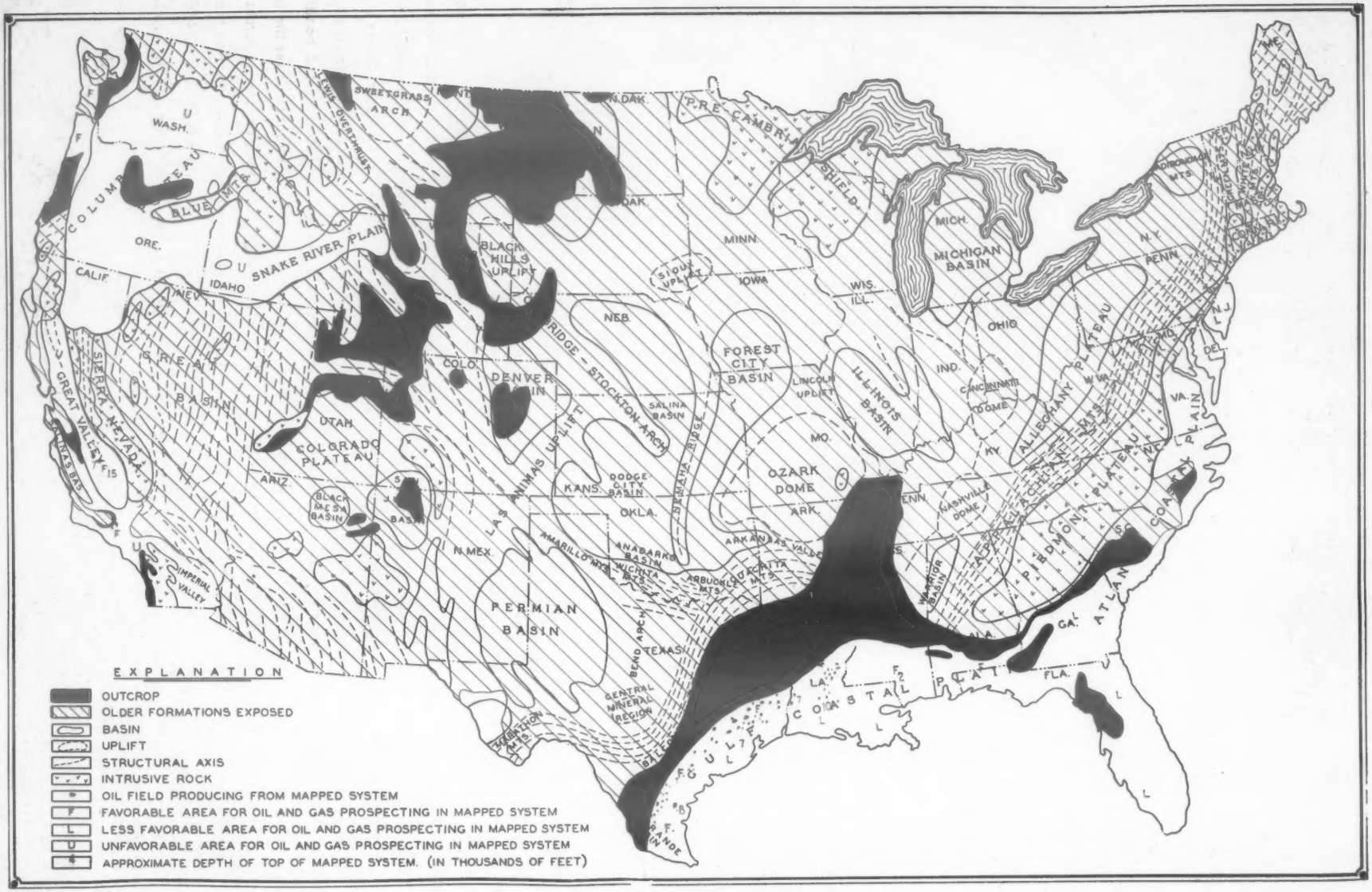
● With petroleum the life blood of mechanized warfare and essential civilian transportation—unfailing performance of oil field drilling equipment is more vital than ever. This equipment must stand up under long hours of continuous operation,—must make hole faster,—and must always be fit and ready for the next job.

The power drives thus are of great importance, and Unit Rig, like all leading makers of drilling equipment, for years has used Diamond Roller Chain Drives. The compact 6-speed Diamond Roller Chain transmission that provides six speeds for the rotary drive and for the drum is one of the outstanding features of the Model U-10.

Unit Rig Model U-24 service hoist with Diamond Chain Drives from engine.

Since the early days of modern types of oil country drilling rigs,—drillers, tool pushers, contractors, and the engineers of the machinery manufacturers have recognized the outstanding advantages of DIAMOND Roller Chain Drives,—their long life,—smooth operation, and their reserve capacity to withstand the severe shocks and loads of drilling and handling heavy strings. They know too that with these drives the load is distributed over many sprocket teeth, separating forces are eliminated, bearing loads reduced,—maintenance on the job cut to a minimum . . . DIAMOND CHAIN & MFG. CO., 475 Kentucky Ave., Indianapolis 7, Ind. Tulsa Office: 2238 Terwilliger Blvd.

Eocene


EXPLANATION
OUTCROP
OLDER FORMATIONS EXPOSED
BASIN
UPLIFT
STRUCTURAL AXIS
INTRUSIVE ROCK
OIL FIELD PRODUCING FROM MAPPED SYSTEM
FAVORABLE AREA FOR OIL AND GAS PROSPECTING IN MAPPED SYSTEM
LESS FAVORABLE AREA FOR OIL AND GAS PROSPECTING IN MAPPED SYSTEM
UNFAVORABLE AREA FOR OIL AND GAS PROSPECTING IN MAPPED SYSTEM
APPROXIMATE DEPTH OF TOP OF MAPPED SYSTEM. (IN THOUSANDS OF FEET)
WASH.
ORE.
CALIF.
IDAHO
NEV.
UTAH
ARIZ.
COLO.
N.MEX.
N.DAK.
MINN.
IOWA
NEB.
KANS.
OKLA.
TEXAS
MO.
ARK.
LA.
MISS.
ALA.
GA.
FLA.
S.C.
N.C.
TENN.
KY.
VA.
W.VA.
OHIO
IND.
ILL.
WIS.
MICH.
PENN.
N.Y.
MD.
DEL.
N.J.
SWEETGRASS ARCH
BLUE MTS.
SNAKE RIVER PLAIN
BLACK HILLS UPLIFT
SIOUX UPLIFT
DENVER BASIN
CANADIAN RIDGE - STOCKTON ARCH
LAS ANIMAS UPLIFT
SALINA BASIN
DODGE CITY BASIN
BRITTANY RIDGE
FOREST CITY BASIN
LINCOLN UPLIFT
ILLINOIS BASIN
MICHIGAN BASIN
CINCINNATI DOME
NASHVILLE DOME
OZARK DOME
ARKANSAS VALLEY
ANADARKO BASIN
WICHITA MTS.
ARBUCKLE MTS.
AMARILLO MTS.
BEND ARCH
PERMIAN BASIN
CENTRAL MINERAL REGION
MARATHON MTS.
BLACK MESA BASIN
SAN JUAN BASIN
COLORADO PLATEAU
GREAT BASIN
SIERRA NEVADA
GREAT VALLEY
IMPERIAL VALLEY
PRE CAMBRIAN SHIELD
ADIRONDACK MTS.
APPALACHIAN MTS.
ALLEGHANY PLATEAU
PIEDMONT PLATEAU
COASTAL PLAIN
ATLANTIC COASTAL PLAIN
WARRIOR BASIN
F. RIO GRANDE

OIL ZONES OF THE UNITED STATES

Eocene

(Compiled by The Oil and Gas Journal)

PRINCIPAL PRODUCING HORIZONS:

Sands: Wilcox, Sparta, Yegua-Cockfield and McElroy (Jackson) in the Texas Gulf Coast district and Louisiana; Wilcox, and numerous sands in the Claiborne and Jackson groups in South Texas; Wilcox (including Carrizo) and Queen City in East Texas; Avenal (Gatchell and McAdams zones) in the San Joaquin Valley of California; the Meganos and other zones in the Tejon in the coastal district of California; and sands in the Wasatch formation of western Colorado and Wyoming.

DISTRIBUTION OF PRODUCING AREAS: The **Wilcox** group, particularly the **Carrizo** formation at the top was known to produce oil in East Texas but production was unimportant, Kittrell, a 16-well field, being the largest producer. Some Carrizo production was found at Clear Creek and Joe's Lake in Texas in 1937 but little interest was taken in this area. However, in 1939, good production was found in the Wilcox at Eola, Louisiana, and in 1940, the Wilcox was also found productive at Ville Platte, which had formerly produced from the **Sparta.** Closely following this were a number of discoveries in Northeast Louisiana and a play started along the whole of the Wilcox trend from the Mississippi River to La Salle County in Southwest Texas. Numerous discoveries have been made along this trend and the fact has been established that the whole section of Wilcox sands may contain productive members.

In the Claiborne group, the **Queen City** and **Weches** members of the **Mount Selman** subgroup also produced small quantities of oil in East Texas but the principal production developed in the **Cockfield** member along the Gulf Coast. In Louisiana, Port Barre, Bancroft and other fields produce from the Cockfield, and Ville Platte and other fields produce from the **Sparta** which is the lowest sand in the group. The largest field, producing from the Cockfield, is Conroe. From this area to the southwest, the Claiborne belt increases in width, although not in productivity. The Pettus sand member is the main pay in Bee County. Sands of **Yegua, Cook Mountain** and Mount Selman age produce along the western belt of fields in Southwest Texas, but their importance is far overshadowed by the Jackson pays.

The Jackson is most important in Southwest Texas, where seven distinct zones are found. These include the **O'Hern** sand (Caddell) which produces in the Cole field; the **Lower Mirando** sand (Caddell) which produces from a number of fields in Webb and Zapata counties; the **Upper Mirando** sand (McElroy) producing in the same area; the **Loma Novia** sand (McElroy) producing in Duval County; the **Government Wells** sand (McElroy) also producing in Duval County along a belt west of the Loma Novia wedge edge; the **Chernosky** sand (McElroy) producing at Seven Sisters and the **Cole** sand (Whitsett) producing in Webb and Duval counties. Farther north the importance of the Jackson decreases and it is not an important producer east of Live Oak County.

In the Rocky Mountain area, the only Eocene production comes from sand lenses in the **Wasatch** formation at Hiawatha, Colo., and LaBarge in southwestern Wyoming.

The California Eocene has produced quantities of oil from the **Gatchell** zone in the Northeast Coalinga and Coalinga Nose fields. It is of secondary importance in the McAdams zone at Kettleman Hills. The **Meganos** at Simi and a sand in the **Tejon** at Bardsdale, both in Ventura County, mark the only Eocene production from the coastal district of California.

EXTENSION INTO OTHER AREAS: The Wilcox trend of coastal Texas and Louisiana is undergoing rapid development at this time and new fields can be expected. Some of the existing fields, such as Lake Creek and Sheridan are distillate fields of large size and there is always a possibility of finding oil farther down on the structure in fields of this type. There is no reason why Wilcox production should stop on the west side of the Mississippi River, but the productive Wilcox trend has not been found in Mississippi yet. Its extension to the southwest is also not thoroughly explored.

The Claiborne and Jackson groups have been pretty thoroughly explored throughout the coastal area and little further development in these zones can be expected.

In the Rocky Mountain area, the Wasatch can be expected to produce additional oil around the margins of the Uinta and Green River basins.

The high productivity of the Eocene pays at Coalinga, coupled with their lack of productivity elsewhere is somewhat of a mystery. Coalinga is believed to lie on the shore line of the Eocene sea and the formation sinks rapidly towards the basin, being 11,000 ft. deep at Kettleman Hills and probably around 20,000 ft. at Buena Vista Hills. Its great depth has, therefore, prevented exploration within the valley. On the east side, at Fruitvale, it is known to pinch out at about 10,000 ft. and there are good possibilities for stratigraphic traps along this side of the basin.

In virgin territory, greatest hope is held out for Eocene production along the coastal valleys of Oregon and Washington.

Seismograph Service Corporation is aggressively attacking the problem of obtaining reliable seismic data from the relatively unexplored deeper horizons of the West Texas and New Mexico Permian Basin.

New techniques are being developed and thoroughly tested under a variety of field conditions.

In particular the results of Seismograph Service Corporation's *Multiple Event Continuous Refraction Profiling Method* holds real promise that this potentially large petroleum province will be opened to extensive seismic prospecting.

Seismograph Service Corporation

Ingenious System Recovers Tank-Generated Vapors

THERE was a time when vapors from lease tank batteries were considered of little value, and in some situations actually were somewhat of a nuisance, but, since the more volatile constituents of petroleum now are at their peak value, the recovery of small volumes here and there in a producing area add up to a valuable contribution to the overall war effort.

A small, but effective recovery system for tank generated vapors is in operation on a lease owned by R. E. Havenstrite, independent producer, in a California field. Oil flowing into and pumped out of a battery of four 2,000-bbl. shipping tanks releases a substantial volume of gasoline vapors, which, when delivered to a nearby gasoline plant, yields a valuable production of propane, and iso and normal butanes.

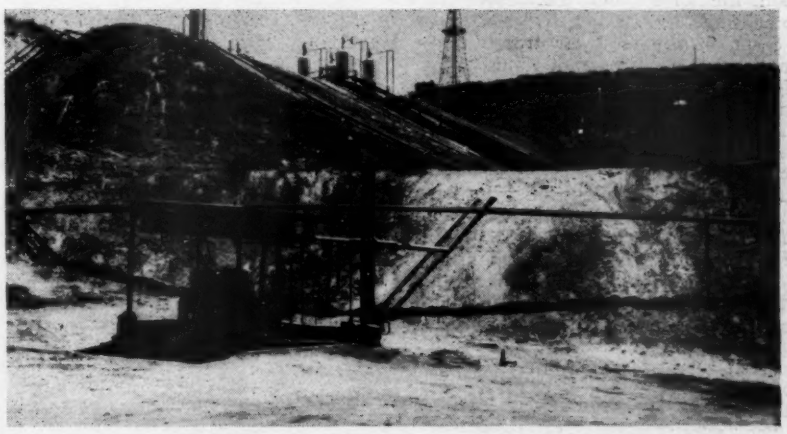
The recovery system makes use of a small, semiautomatic vacuum station which requires only a minimum amount of attention by the pumpers, well switches and operators of the gasoline plant. The station consists of a 10-in. by 7-in. belt-driven compressor powered by a small multicylinder gas-gasoline engine.

Lease tanks are equipped with pressure and vacuum breaking fittings and appliances to hold a conventional pressure on the contents, and the vapors removed pass through a pressure vacuum control valve as they are produced above the predetermined tank pressure. This more or less wet gas is conveyed through a gathering line to a homemade scrubber, fashioned from a piece of large casing, to prevent condensate from entering the compressor cylinder of the vacuum unit. A bypass is fitted into the suction line around the scrubber so that this unit can be removed from service without hindering the flow of the tank vapors. In ordinary operation, the compressor pulls from 15 to 20 in. of vacuum, Hg, on the gathering line, and discharges against a line pressure of 25 to 30 lb., or sufficient pressure to pass the gas into the gasoline plant gathering system, which takes gas principally from oil and gas separator units in the various parts of the surrounding oil field.

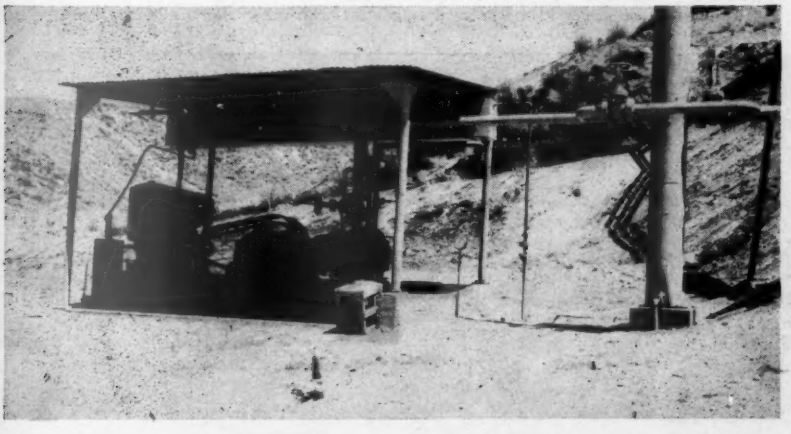
The compressor and engine installation is located in an open-wall housing just outside and beneath the dikes which surround the flow tanks. It is set on a concrete base, surrounded by a foot-high concrete wall to prevent mud and water from washing in on it during rains. A corrugated sheet-iron roof is supported on 2-in. pipe posts set in the corners of the protecting wall.

Cooling-Water Feed

Cooling water for the compressor cylinder and makeup water for the engine radiator is fed from a long, rectangular tank hung by brackets from the under side of the roof. For this purpose, the tank is equipped with fittings and lines connected to the intake and outlet of the compressor cylinder jacket, through which the water is circulated continuously by the thermo-syphon action. Another small line leads to the filler neck of the engine radiator.



Small engine-driven vacuum unit installed to recover gasoline vapors exhaled from oil in storage so that it can be processed to extract critical fractions for the production of high-octane gasoline. Separators on side hill below flowing well, and lease battery at right



Vacuum unit beneath corrugated iron roof showing water box to which circulating pipes are connected. Improvised homemade intake scrubber at right

The tank is kept filled by means of a lead line from the property water supply line.

The engine is lubricated by the conventional crankcase pump and splash system. The compressor is oiled by a force-feed lubricator with a reservoir large enough that replenishing is necessary only at extended intervals.

In case of a shutdown of the unit, vapors from the flow and shipping tank battery can be passed into a line leading to a riser to be stacked to the air.

The lease tank battery is located down hill from the separators permitting gravity flow of the separator fluid to the tanks. The separators at low pressure give a fairly high initial separation of light ends from the crude for gasoline plant operation.

The "Little Inch" of The Battle Zones

Field practices for the construction and operation of military portable pipe lines, which are a contribution of the petroleum industry to warfare of the United Nations, are described in an article furnished by Public Relations Office, Camp Claiborne, Louisiana.

A PORTABLE, lightweight steel pipe line that carries petroleum products or water into the battle area, for the Allied men and machines of invasion has advantages that are apparent. Laid alongside a road, the pipe line can do the work of tank trucks, and relieve congestion in traffic, plus saving tires, machines and manpower.

Although nothing can be guaranteed safe from bombing and strafing, the thin shadow of a pipe line along the ground is a target not easy to hit. Parts of the installation other than the pipe lend themselves to camouflage.

Some of the engineer troops that provided this on-the-spot liquid supply service via pipe line were activated and trained at the Engineer Unit Training Center, an Army Service Forces installation at Camp Claiborne, Louisiana. An undisclosed number of the petroleum-distribution companies—as the pipe-line units are called—have left the E.U.T.C. for overseas duties. More are in training.

From the training given the petroleum companies at the E.U.T.C., a good insight into their makeup and functions can be had. One should bear in mind, however, that combat conditions may alter the theory as taught.

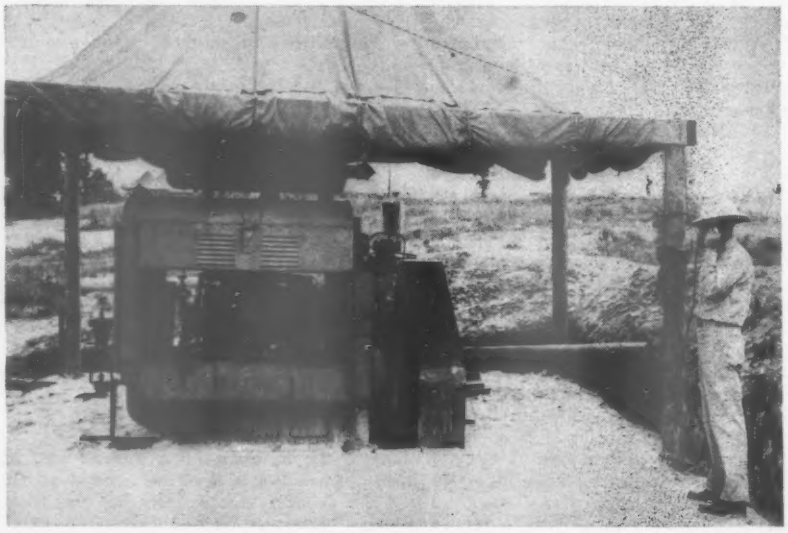
The "artery" of the distribution system is the portable pipe line which each company lays, operates, and maintains, and which can carry any liquid an army would need. A skilled crew can lay the pipe atop the ground at the rate of 10 miles a day, under favorable conditions. Thus not long after the crew begins construction, the slender line can be throbbing with the lifeblood of modern war—gasoline for the planes of the Allies, diesel fuel for the slower earthbound craft, or water.

Two sizes of the pipe are in use in the training at the E.U.T.C.—4-in. and 6-in. To cite the portability of the line, a 20-ft. joint (the usual length) of the 4-in. steel weighs but 90 lb., an easy load for two men.

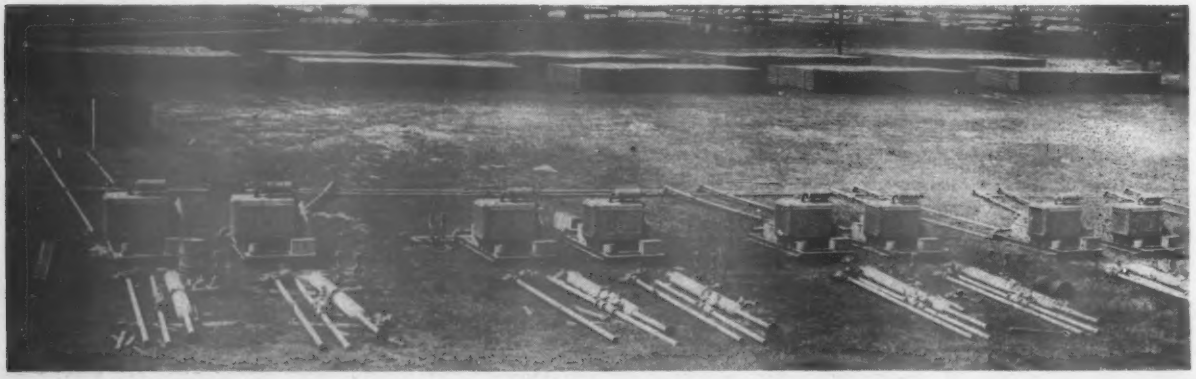
The lengths of pipe are joined together by a standard Victaulic coupling and a rubber gasket. The latter needs no shellac, and can be used more than once. Tighten the two bolts in the coupling, after the grooved ends of two joints of the pipe have been butted together and gasketed, and the line is under construction. Repeat this process 264 times, and you've laid 1 mile of pipe line.

The joints account for the flexibility of the line, for the pipe itself has no "give." Because of the joints, the line can follow easily the more gentle curves of the earth, over hills, across valleys.

For sharper bends, however, an "elbow" must be used. The joints will



Pumping station in operation on portable pipe line at the E.U.T.C., Camp Claiborne, Louisiana. Phone is used to contact with other stations along line



A group of motors, in foreground, are bunched together for testing purposes. Stock pile of portable pipe is in background. In actual operations of the petroleum-distribution companies in training at the E.U.T.C., the pumping units are spaced much farther apart, to stimulate conditions the companies will meet when their training days are over

Erecting one of the sizes of portable steel tanks used by the petroleum-distribution companies of liquid storage at terminal points along portable pipe lines

stand some bouncing from near-hits by falling bombs. At river crossings, where the water is not swift enough to tear the line out, the men of the petroleum companies can sink their line to the bottom of the river bed, using heavy clamps for weights.

The heart of the portable pipe-line system is the pumping station, which is moved by truck. The station consists, in the main, of an engine, a pump, and a sand trap, the latter for catching abrasives that might clog the flow, or wear the pumps.

Utilizing a reciprocating pump, a semiautomatic system can be set up for the delivery of a uniform flow through each station. For example, the 4-in. line can be made to carry 200 bbl. an hour, with a pressure differential of 200 lb. As the system in use for training at the E.U.T.C. is designed, the stations can be 10 miles apart on level ground, before the flow of liquid goes below 200 bbl. In mountainous country, this distance will shorten. Under the best of conditions, one petroleum distribution company can take care of 120 miles of the 4-in. line.

Hydraulic Control

If the system is operated semiautomatically, one has only to start the pumps. The hydraulic control will keep the flow uniform, at the desired rate. If a break occurs in the line, the pumps ahead of the breach automatically slow to an idle, thus saving wear on the motors pumping against the dry line. To the practiced eye, the pressure on the upstream station will indicate within a half mile where the line is broken.

The distribution company can tap the line for delivery of fuel at any point between the terminals, and needs no storage points except at the ends of the line. For the purpose portable steel tanks are provided, in capacities that range upward from 250 bbl. The tanks are carried in sections, which are gasketed and bolted together when a storage point is needed. The average crew of six men can erect a 500-bbl. portable in a day. A number of these containers, dispersed and concealed about an airport, make for a decentralized gasoline supply not as vulnerable to air attack as the traditional large storage tank.

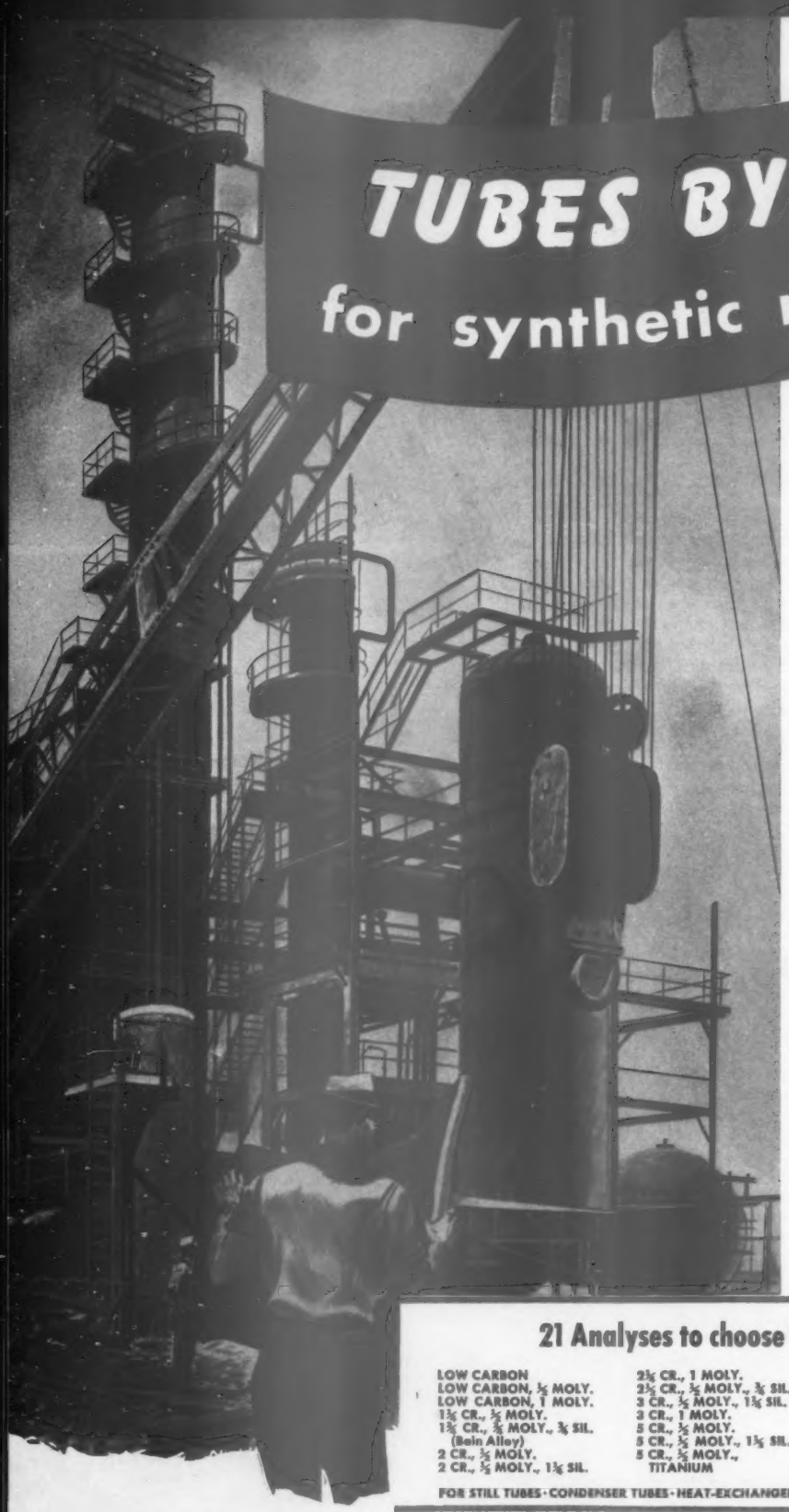
There is very little that is new and startling about most of the equipment used by the petroleum distribution companies, although its employment in battle is a growth of this war. The hydraulic control that insures a uniform flow is a new development, and was designed by S. S. Smith, of Shell Oil Co., Inc. Mr. Smith also did the pioneer work in designing the system that would bring together the various parts of standard equipment.

The trainees of the petroleum companies receive the standard engineer basic subjects for the early weeks of their stay at Camp Claiborne. Next come 2 weeks of primary pipe-line school, and 2 weeks of advanced, to familiarize the men with the specialized equipment they will employ. Those weeks are followed by two more, for a field problem, during which time each company sets up a pipe-line system and operates it (pumping water), under the direction of the commanders they will have in the theater of operations.

During this period they must keep the water pumping in spite of "sabotage" by members of the petroleum subsection, who may go so far as to blast out the line, to teach the operators to find and repair a break quickly. Operations under blackout conditions are included in this stage of training, and help impress the trainees with what they may encounter in the field later. Following the problem, the company is ready for action.

Theirs will be the job of laying and guarding one of the lifelines of battle.

Right: Steps in rubber gasketing, to join together two lengths of 4-in. pipe, in training operations of engineer petroleum-distribution companies at the E.U.T.C., Camp Claiborne, Louisiana



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LOW CARBON, 1 MOLY.
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1¾ CR., ⅜ MOLY., ¾ SIL. (Bain Alloy)
2 CR., ½ MOLY.
2 CR., ½ MOLY., 1¼ SIL.
2¼ CR., 1 MOLY.
2½ CR., ½ MOLY., ¾ SIL.
3 CR., ½ MOLY., 1¼ SIL.
3 CR., 1 MOLY.
5 CR., ½ MOLY.
5 CR., ½ MOLY., 1¼ SIL.
5 CR., ½ MOLY., TITANIUM
5 CR., ½ MOLY., COLUMBIUM
7 CR., ½ MOLY.
9 CR., 1 MOLY.
17 CR.
18-8
18-8, TITANIUM
18-8, COLUMBIUM

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*During the present emergency the Office of Petroleum Coordinator has recommended to refineries that orders be confined to a limited number of alloy classifications. It will be understood, therefore, that the 21 analyses shown are given as a matter of engineering information, and that some of these alloys may not be available during the period of restrictions.

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Catalysts Reduce Sulfur Dioxide to Sulfur

ELIMINATION of sulfur fumes (mainly the dioxide) from industrial gases such as those emanating from processing high-sulfur crudes may become a relatively simple matter as a result of recent experimental work by Doumani, Deery and Bradley and Union Oil Co. of California. Reported before the petroleum division, American Chemical Society, at its recent meeting in Pittsburgh, Pa., this work has disclosed that sulfur dioxide is reduced practically quantitatively with hydrogen in the presence of an iron sulfide catalyst and an alumina catalyst. The process is two-step and some hydrogen sulfide is also formed, the reaction apparently reducing the sulfur too far to the sulfide state, which sulfide is then reacted with more of the dioxide to reduce both to elementary sulfur.

Preliminary Results

Preliminary results showed that metallic oxides such as ferric oxide, bauxite, etc., had little catalytic activity until they had been under the gas stream containing sulfur dioxide, hydrogen sulfide, etc., for some time, when their reactivity as catalysts increased. Bauxite containing larger percentages of iron becomes a good catalyst after a pretreatment with hydrogen sulfide and converting the iron oxide to sulfide. Sulfur dioxide in waste gas was reduced from 2.8 per cent to zero in dry gas, at 900° F. and atmospheric pressure; with 13.3 per cent of water in the gases the SO_2 in the exit gases was 0.24 per cent; hydrogen sulfide formed in about the same amount in each case, 2.37 per cent in dry gas, 2.56 per cent in wet gas. Hydrogen in the reacting gases was from 5 to 10 per cent, the higher value giving the results shown here.

The best catalyst found is about 25 per cent of ferric oxide and 75 per cent alumina, the iron being converted to the sulfide by pretreatment with H_2S. At 600° F. and atmospheric pressure, with 9 per cent hydrogen such a catalyst reduced 3 per cent SO_2 gases to 0.2 per cent SO_2 in a 13 per cent water-vapor feed gas with 2.4 per cent of H_2S formed. At 900° F. and with 7 per cent H_2 0.7 per cent of SO_2 was unconverted and with only 1.3 per cent H_2S.

Highly purified alumina catalysts are best when reducing the dioxide with H_2S. Data show, however, in the opinion of these experimenters that the hydrogen-iron sulfide process is the best of any tried. A bright spot in the process is the fact that, the sulfide being the catalyst rather than the oxide, sulfur does not deactivate the catalyst but may blanket it as time goes on with a physical covering of molecular sulfur which may be removed by heating the catalyst to 932° F. to volatilize the sulfur blanket which is recovered by subliming.

Exploring the "Dark Continent" of Heavy Hydrocarbon Structure

GRADUALLY, with almost painful slowness and prodigious amounts of work for each fact gained, chemists are exploring and charting the great "wastes" of the structure of the heavier hydrocarbons. Because of the much simpler isomeric structures possible in the lighter products the hydrocarbons of the motor and aviation-fuel range have been rather well investigated; their properties, reactions and syntheses are known and accomplished. Among those desirable ones, useful especially for their commercial and industrial properties, only a relative few are made commercially in isolated states. Very recently the synthesis of triptane, master product in supplying fuels with superoctane numbers, has been announced by Ipatieff and Haensel. Others of the high-octane number hydrocarbons will doubtless be synthesized as synthetic hydrocarbon chemistry's boundaries are expanded by the accelerated pace set by war's demands.

Complexity of Hydrocarbons

Hydrocarbons in the gas-oil and lubricating-oil ranges are structurally so complex and their isolation and purification so difficult that progress has been relatively slower than in the study of the light gasoline series. Recently Dr. F. C. Whitmore and his collaborator group of students, at Penn State College have completed synthesis of a large number of heavy cyclicized hydrocarbons and have determined many of their important properties. Methods of synthesis have not yet been announced although Whitmore has promised this information in a later paper. Many of their physical properties have been determined and general conclusions have been drawn regarding the effect of the different molecular configuration on physical properties. This work is part of A.P.I. Research Project 42.

The substituted methane family has been studied exhaustively, in which three or four of the hydrogens in methane have been substituted by several types of C-8 groups. These substituent C-8 groups are phenylethyl, C_2H_5 — C_8H_5; cyclohexylethyl, C_2H_5 — C_8H_{11}; and cyclopentylpropyl, C_3H_7 — C_8H_9, substituted in various combinations on methane along with the paraffin group n-octyl, C_8H_{17}.

Tentative Conclusions

Without going into detail as to methods of test these experimenters have drawn the following tentative conclusions from their work so far as it has gone: Cyclization of a hydrocarbon invariably increases the boiling point. A high percentage of total carbon in aromatic (phenyl) rings in the molecule produces a boiling point considerably higher than in naphthenic molecules of the same general structure and molecular weight. Cyclization of the molecule changes the melting point variably; the more symmetrical the molecule the higher the melting or pour points. Cyclization increases viscosity greatly. Cyclohexyl groups added to the molecules increase viscosity much more than do either phenyl or cyclopentyl groups, phenyl groups causing the smallest increase. Phenyl and cyclohexyl groups decrease the kinematic viscosity index, a decrease which is about the same for each of them and which becomes huge with greater percentages of carbon is the rings; cyclopentyl rings have little effect on kinematic V.I. Density and refractive index are both increased by cyclic groups, that from aromatic groups being much greater than from cycloparaffinic (naphthenic) groups. Phenyl groups lower aniline points tremendously, cyclopentyl and cyclohexyl groups showing some effect but much less than phenyl groups show, cyclohexyl causing the smallest decrease.

This work is being continued and eventually we shall know enough about structure and its effect on properties to synthesize lubricating oils, etc., with much greater foresight and intelligence.

Questions on Technology

(Continued from page 56)

in which

H = height, ft.

for chimneys the area is larger because of the thicker wall, being about

$$A = 1.27\sqrt{V}\,H \text{ (chimneys)}$$

Stacks equation:

$$2U\,(0.89)\,\sqrt{V}\,H\,\frac{(T_1+T_2)}{2}=37V\,(T_1-T_2)$$

$$1.3\times 0.89\,\sqrt{V}\,H\,(T_1+T_2)=37V\,(T_1-T_2)$$

$$1.16\,\sqrt{V}\,H\,(T_1+T_2)=37V\,(T_1-T_2)$$

this equation can be arranged in the convenient form

$$\frac{T_3}{T_1}=\frac{37\sqrt{V}-1.16\,H}{37\sqrt{V}+1.16\,H}=\frac{T_2-T_A}{T_1-T_A}$$

Chimney equation:

$$(1.27)\,(0.278)\,\sqrt{V}\,H(T_1+T_2)\;37V\,(T_1-T_2)$$

$$\frac{T_3}{T_1}=\frac{37\sqrt{V}-0.353\,H}{37\sqrt{V}+0.353\,H}=\frac{T_2-T_A}{T_1-T_A}$$

These equations were solved for various heights (H) and capacities (or diameters) which are a function of V. The capacities or values of V are dependent upon the velocity employed, and since high velocities can be used in short stacks (or chimneys) and low velocities must be used in very tall stacks (or chimneys) in order to avoid prohibitive friction losses, the following velocities and values of velocity, diameter, etc., were employed in preparing the figure on this page.

Diameter (ft.)	Height (ft.)	Velocity (ft./sec.)	$\sqrt{V}$
3.5	50	30	17.3
	100	16	12.6
	150	10	10.0
7.0	50	30	34.6
	100	16	25.3
	150	10	20.0
	200	8	17.9
	250	5	14.1
14.0	50	30	67.0
	100	16	49.0
	150	10	38.6
	200	8	34.6
	250	6	30.0

Example of Use of Chart

A 100-ft. stack has a diameter of 6 ft. The flue gas enters the stack at 700° F. and the air temperature is 35° F.

For these conditions the ratio of temperature differences from the figure is about 0.75.

Outlet temp. = (700 — 35) 0.75 + 35

= 535° F.

If the same condition occurred in a 250-ft. chimney the ratio would be about 0.69.

Outlet temp. = (700 — 35) 0.69 + 35

= 495° F.

Under normal conditions (not a driving rain) the temperature loss would be much less, probably not larger than one-third of the above losses. This would give normal outlet temperatures of 625°-650° F.

Correction

In the article "Consolidation of Gasoline Plants a Conservation Step," in our September 2, 1943 issue, page 36, column 3, paragraph 2, the statement, "recycled through the absorber, where the oil ratio is maintained at about 22 to 27 gal. per million cubic feet of gas," should read "where the oil ratio is maintained at about 22 to 27 gal. per thousand cubic feet of gas."

We suggest that readers enter this correction in their original copies of that issue, in order that continuance of the error may be avoided. To experienced gasoline-plant operators the discrepancy is obvious at once but less experienced readers may be misled.

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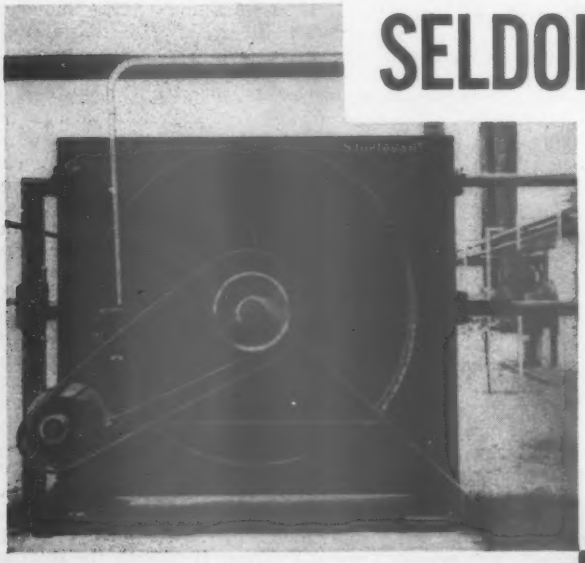

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COST ANALYSIS—ACID TREATMENT

SUCCESS of any acid treatment to increase oil production depends to a large extent upon a careful study and analysis of the individual well, before the work is done. A frequent type of acid treatment is encountered in workover jobs where the well may or may not have been acidized previously. In either instance, the primary reason for performing the acid treatment, is to obtain increased profits. Consequently, a careful cost analysis is essential. Usually, this cost analysis takes one of several different forms. An estimate of the cost of acidizing together with the estimated increased profits is prepared at the time the recommendation is made.

After the work has been performed, one or more cost analyses are made to determine the profit or loss on the treatment. Many operators keep a continuous summary of all workover jobs and this record is brought up to date every month.

Recommendation—Acid Treatment

The recommendation for acid treatment should give a clear picture of all factors involved. Many operators have standard information "forms" for those jobs which occur frequently, and such a form must accompany the request for expenditure. This affords a quick and simple method for presentation of data. Information which might be shown is as follows:

PERTINENT DATA—WELL "A"

Present oil production (bbl. per day)	6
Present water production (bbl. per day)	61
Producing formation	Simpson and Wilcox
Open hole (ft.)	154
Condition of hole	Clean
Condition of casing	Good
Previous reconditioning	None
Estimated cost of acid treatment	$750
Estimated increase in oil production (bbl. per day)	50
Estimated payout period (days)	15

Other information, not shown above, would include the well log, history of well, and other data which might have a bearing on the proposed work. In the present example, the well was producing both from Wilcox and Simpson dolomite. Since the water was being produced from the Wilcox, the acid treatment was performed by sealing off this zone and acidizing the overlying Simpson dolomite section.

After the work has been performed, a cost statement showing the financial status of the work should be kept available. A graph, of daily oil production, plotted by months, for the above well is shown in the accompanying figure.

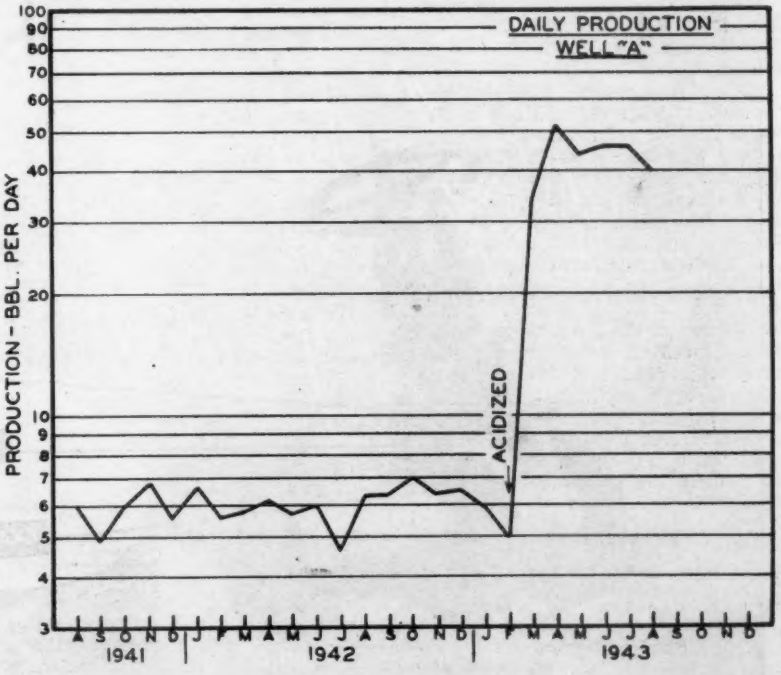
For more than a year, previous to the acid treatment, the well has been producing approximately 6 bbl. of oil and 60 bbl. of water per day. After the acid treatment, oil production increased to approximately 50 bbl. of oil per day and subsequently dropped to about 45 bbl. per day.

A cost analysis, prepared 6 months after the acid treatment is shown in Table 1. The estimated gross production (based on monthly well tests) for the 6-month period was 8,129 bbl. The estimated amount of oil for the same period, which the well would have produced if the acid treatment had not been performed, is deducted from the foregoing figure. The result is the increase in gross production from acid treatment. As shown in Table 1, an increased profit on oil sales of $6,594 resulted from the acid job. It is necessary to deduct items of expense in order to determine the net profit. These items include cost of the acid treatment and any increase in direct operating expense. Due to the fact that an increased amount of fluid was being handled, the well repair expense in the present example was considerably higher than it was before acid treatment.

It will be noted that the net profit, resulting from the acid treatment is $5,265 as of September 1, 1943.

TABLE 1

Revenue	
Estimated gross production, bbl. (3-1-43 to 9-1-43)	8,129
Estimated gross production (for same period if well had not been acidized), bbl.	920
Increase in gross production, bbl.	7,209
Increase in net production (seven-eighths of gross), bbl.	6,310
Value of net production increase ($1.10 per bbl.)	$6,941
Less gross production tax (5 per cent—Oklahoma)	347
Increased profit on oil sales	$6,594
Expense	
Cost of acid treatment	$624
Increase in well repair expense (3-1-43 to 9-1-43)	705
Total expense due to acid treatment	$1,329
Net profit from acid treatment	$5,265



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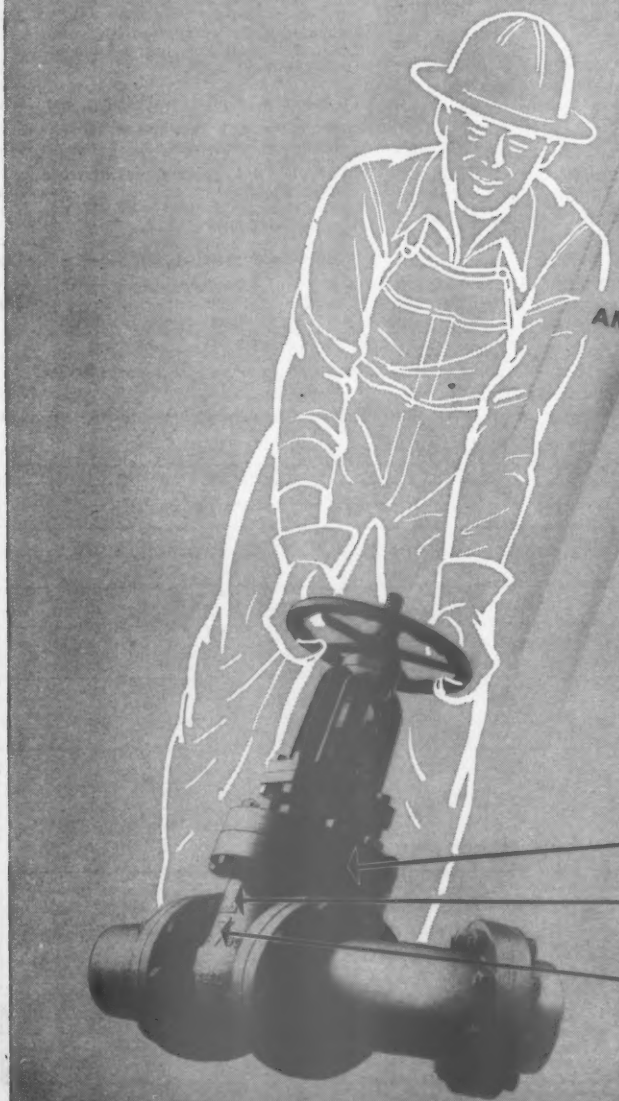

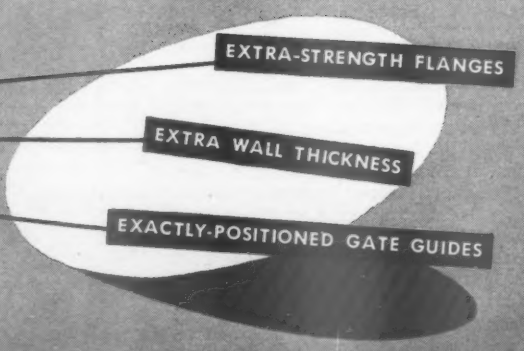

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PREPARING CORES FOR ANALYSIS

WHEN a core is brought to the surface in a core barrel, it is important that samples of the core be taken quickly from the barrel and sealed in containers without delay in order to reduce alteration of the fluid content by evaporation and contamination. The coating of drilling mud on the core should be scraped off, never washed off.

It is seldom necessary to seal into containers the entire core. Representative samples should be systematically chosen. This may be done either by taking a sample from the core at regularly spaced intervals or at each visible change in sand character. In either case it is necessary that each sample be labeled as to the depth interval of which it is representative.

Samples chosen from the core should preferably be wrapped in cellophane, lead foil, or other suitable liquidproof covering and bound tightly with adhesive tape. The wrapped core should then be sealed in suitable airtight containers such as fruit jars or tin cans. It is also often desirable to send to the laboratory, whenever possible, samples of the drilling fluid used in coring and samples of oil and water produced from the cored interval. Uncontaminated oil and water samples from the formation cannot always be obtained, but sometimes such samples can be taken from the same well at some time after the core is obtained or from a nearby well producing from the same formation.

Division of Samples

In the laboratory each sample may be divided into three parts. One of the parts may be used for permeability and porosity determination; another for oil and water saturation tests; and the third for salinity measurement, sieve analysis, and petrographic classification. Any surplus sample left after making those tests may be preserved in a sealed container for making later check tests.

The test for fluid content should be made first, and without delay, in order to avoid evaporation losses. Further preparation of the sample for fluid-content determination has been described in Installments 103 and 104 of this series.

The sample to be used for permeability and porosity tests should first be drilled or trimmed to get a suitable permeability sample. Either the permeability sample may later be used for porosity measurement or an irregular chunk, not suitable for measurement of permeability, can be used. It is particularly important when dealing with friable, semiconsolidated sands to obtain a good permeability sample before dividing any of the original sample for porosity measurement. Sometimes on such sands two or three trials must be made, and some of the sample lost, before a suitable piece for permeability measurement is obtained.

Cores can be satisfactorily extracted with carbon tetrachloride or ethylene dichloride in a Soxhlet extractor, and can be dried in an oven. However, such extraction requires a minimum of about 5 hours, and the drying by this method requires at least 3 hours. Pyle and Sherborne* report a method of leaching out the oil and water content by pumping hot solvent through a permeability specimen and then drying with hot dry air. By this means, satisfactory extraction and drying are both accomplished in 30 minutes. In their paper, Pyle and Sherborne give a flow diagram of such a leaching apparatus. Since core analysis results are often wanted rather quickly, this pressure-extraction method is much more popular than the first method mentioned.

*Pyle, H. C., and Sherborne, J. E., "Core Analysis," Petr. Dev. & Tech. 1939, A.I.M.E.

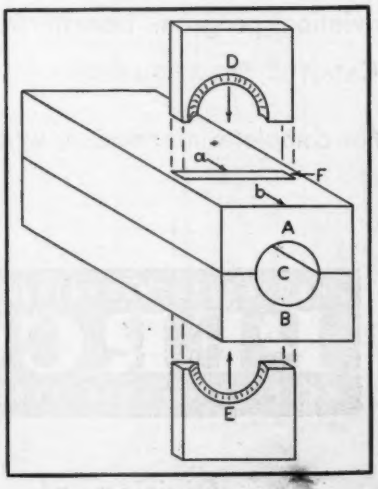

Fig. 1

When dealing with a consolidated core a diamond drill which will cut a core of ¾ in. to ⅞ in. diameter is the most satisfactory method of sizing a permeability sample. When dealing with a friable sand that cannot be drilled, the trimming can be done with a knife or hack saw and a specimen prepared in the form of a rectangular prism.

Preparation of Samples

A drilled cylindrical sample for permeability test should preferably be about 2 in. in length in order to allow room for a smooth, square break when the finished sample, about 1 in. long, is prepared. A device that can be used in getting such a smooth break is illustrated in Fig. 1. It consists of a rectangular block of steel cut in two halves, A and B. A hole, C, of just the proper size to fit the sample cut by the diamond drill, is provided along the juncture of the two halves of the steel block so that the cylindrical hole C is halved axially when the two blocks are separated. Hardened steel knives D and E fit into the rectangular slots F and have curved cutting edges of slightly less diameter than the drilled core specimen.

To break the 2-in. specimen to the desired length of 1 in. and leave a clean break on each end of the 1-in. sample, the following procedure is used. The 2-in. sample is placed in the cylindrical space between the two steel blocks so that about ½ in. of the core is on one side of the knife edges and 1½ in. on the other. The knives are placed in position in the rectangular slots so that they rest against the core. The lower knife is rested on a solid support and the upper knife is struck a sharp blow with a hammer. This will generally produce a reasonably smooth break perpendicular to the axis of the cylindrical sample. The 1½-in. piece is now placed in the space between the blocks with the freshly broken end flush with the end "a" of the block. The knives are placed with their cutting edge against the edge "b" of the slots which is 1 in. from the end "a." A sharp blow as before will break the sample leaving the desired 1-in. specimen for the permeability test.

Series prepared by Glenn M. Stearns, associate professor of petroleum engineering, University of Oklahoma

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Division of

PHILLIPS PETROLEUM COMPANY, *Bartlesville, Oklahoma*

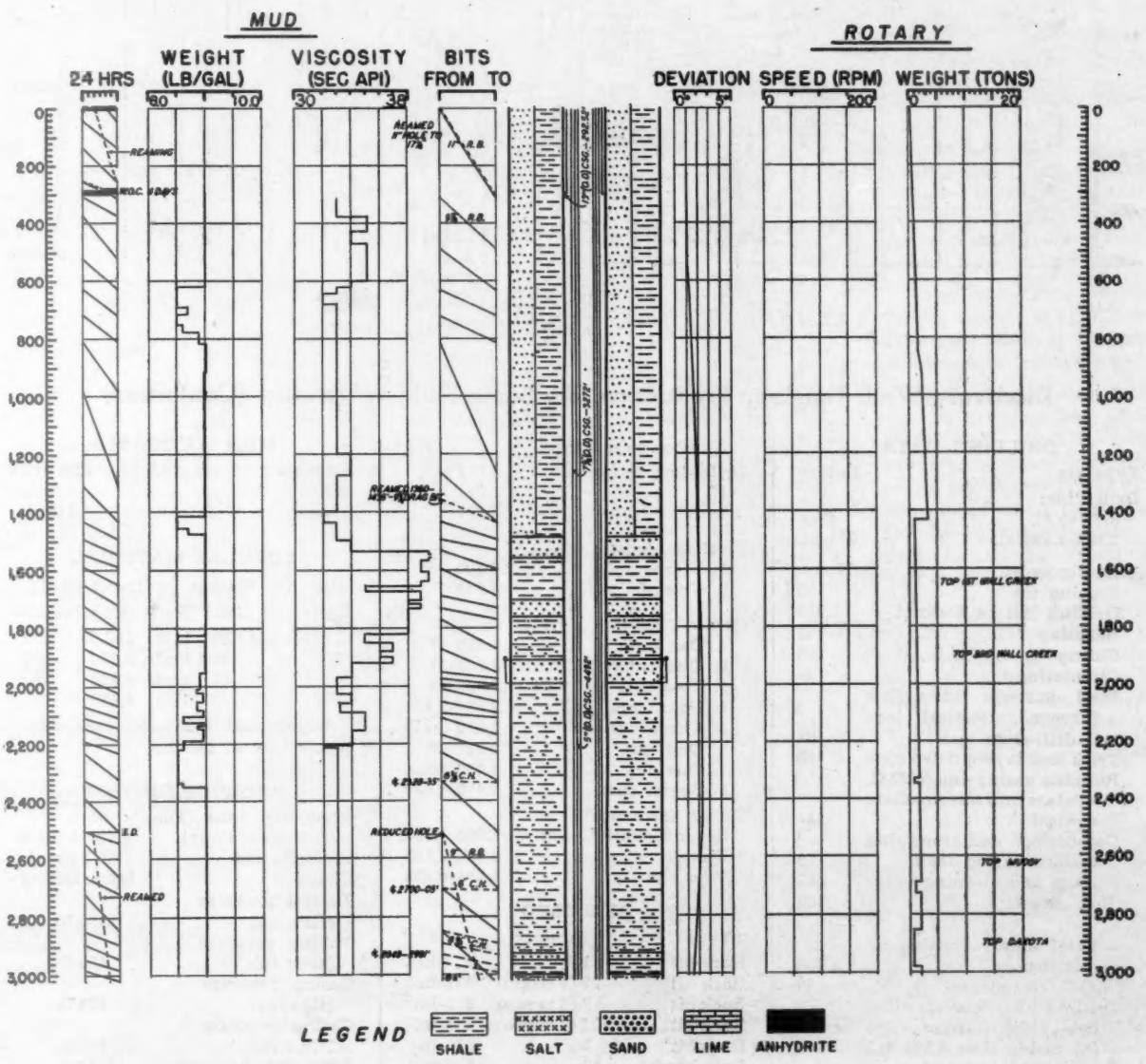
Journalog

No. 38

Discovery Well, Tensleep Production, Elk Basin Field, Wyoming

MINNELUSA OIL CORP. 1-ET-A HENDERSON
330 ft. from NL and 430 ft. from EL, 31-58n-99w, Park County, elevation 4,952 ft.

CONTRACTOR
Fain Drilling Co.,
Oklahoma City, Okla.



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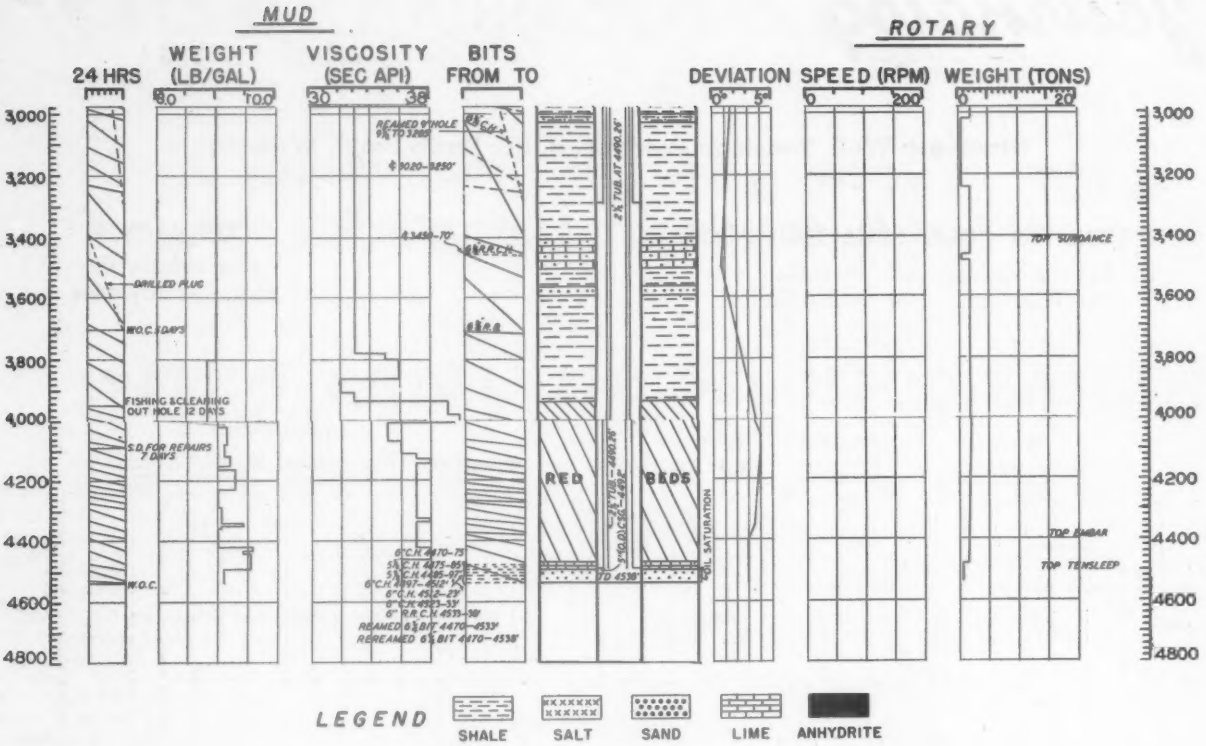

Discovery Well, Tensleep Production, Elk Basin Field, Wyoming (Continued)

DRILLING DATA

Type rig	Rotary
Drill Pipe:	
0-3,705 ft.	4-in.
3,705-4,538 ft.	3½-in.
Time Record:	Hours
Rigging up	130
Drilling (bit on bottom)	1,016
Reaming	85
Coring	190
Circulating	36
Well surveys (deviation surveys, electrical logs and drill-stem tests)	67
Trips and laying down pipe	246
Running casing and W.O.C. (surface and intermediate strings)	312
Cementing and repairing surface casing leak	10
Fishing and cleaning hole	286
Shut down	302
Total time to setting oil string	2,680
W.O.C. (oil string)	88
Drilling plug and cleaning hole (top of plug 4,456 ft., casing shoe 4,490 ft.)	10½
Running tubing and completion (including 1 hour circulating)	8½
Total completion time	107
Over-all well time	2,767
Number round trips	100

Drill-stem tests:	Feet
1.	1,987
2.	2,981

Electrical logs:	
1. From	3,705
2. From	4,538

Cores:	
1. One cut	1,985-87
2. One cut	2,328-35
3. Two cuts	2,700-13
4. Four cuts	2,848-2,981
5. Three cuts	3,020-3,110
6. One cut	3,228-50
7. One cut	3,450-70
8. Seven cuts	4,470-4,538

Oil or gas sands:	
Second Wall Creek	1,905-1,987
Dakota	2,924-2,952
Tensleep	4,494-4,538

BITS USED

Type	Number	Size
Rock bit	1	11 -in.†
Rock bit	25 (4 rerun)	9⅞-in.
Rock bit	7 (2 rerun)	9 -in.
Rock bit	23 (1 rerun)	6¾-in.
Drag bit*	1	9⅞-in.
Core heads	42	6 -in.
Core heads	1	5⅞-in.
Core heads	1	5⅝-in.

*Used for reaming. †Reamed surface hole with pilot bit and 17¼-in. reamer.

MUD MATERIALS

Aquagel	126 sacks
Jelflake	6 sacks
Lime	1 sack

TUBULAR MATERIAL

Size (in.)	Weight (lb.)	Type	Depth (ft.)	Cement (sacks)
13 (12¾ I.D.)	50	L.W.	292.52	175*
7⅝	26.4	Smls.	3,272	450
5	15	Smls.	4,492	200
2½		Tbg.	4,490	

*Additional 100 sacks pumped to repair leak at 148 ft.

PRODUCTION TEST

Producing zone (Tensleep sandstone)	4,494-4,538 ft.
Time flowed	3 hr.
Choke	Open tubing
Tubing pressure (flowing)	165 lb.
Tubing pressure (shut in)	480 lb.
Casing pressure (flowing)	150 lb.
Casing pressure (shut in)	480 lb.
Separator pressure	15-50 lb.
Oil (based on 3-hr. test)	2,000 bbl./day
Water	None
Gas-oil ratio	335 to 1
Gravity of oil	30.5° A.P.I.

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Tear-down Time

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REFINING

W. R. Argyle Joins PAW Division of Refining

WASHINGTON, D. C.—William R. Argyle, on leave as assistant manager of refining for Sinclair Refining Co., with headquarters at Marcus Hook, Pa., has been appointed assistant director of the Refining Division, Petroleum Administration for War.

In June 1920, Mr. Argyle joined the staff of the Sinclair Refining Co., as a fuel engineer. Four years later he was appointed refinery superintendent, a position he held until recently, when he was promoted to assistant manager of refining. He resides at Swarthmore, Pa.

He received his early education in Utah where he was born, graduating from the University of Utah in 1915. He served the U. S. Bureau of Mines as an assistant physicist until 1920.

Lethbridge Refinery Resumes Operations

LETHBRIDGE, Alta.—The refining plant of Pacific Oil & Refinery Co., east of Lethbridge, has resumed operations with a daily capacity of 1,500 bbl. of crude.

Some months ago the company took over the old Huff Refining Co. plant, which has since been enlarged and modernized. The plant will produce gasoline, distillate, diesel oil, kerosene and fuel oil, and is so constructed that road oils and asphalt can be produced when their sale for civilian use is again permitted. The plant will operate largely on Alberta crude, taking the output of the Dominion wells in the Taber field and crude from the Del Bonita and Twin River fields, in which it is drilling two wells. British-American Oil Co. has contracted to take all the lighter products.

Oil Cargo Surcharge Rates Cut Materially by WSA

WASHINGTON, D. C.—Materially lower freight rate surcharges on petroleum, petroleum products and other liquid cargo shipments into and between foreign areas were announced last week by the War Shipping Administration. The surcharges, effective September 22, cover various bulk liquid cargoes being transported over many sea routes.

Fourteen of the new rate schedules apply to petroleum. A sharp slash was made in the rate on cargoes of petroleum from the Netherlands West Indies and United States Gulf ports to the Portland Pipe Line and to Halifax, Nova Scotia.

The reduction in these surcharges reflects the generally improved conditions in the various trade areas involved.

Standard of California Increases Crude Runs

LOS ANGELES, Calif.—Refineries of Standard Oil Co. of California handled 33 per cent more crude oil during the second quarter of 1943 than during the same period last year. Present operations are at virtually full capacity and shipments of 100-octane gasoline from refineries are approximately double those of last year. The company is pressing intensive efforts to develop new crude-oil supplies. Gross production, highest in years, averaged 156,582 bbl. per day during the second period of the present year. Refinery runs went up to 229,000 bbl. per day.

Standard of California's new plant to produce toluene has been completed and initial shipments have already been made.

Completion of the company's new butadiene plant is anticipated this fall. In addition to this unit, the company is erecting a plant to produce 100-octane aviation gasoline at a cost of approximately $13,500,000.

District 4 Refiners Urged To Raise Gasoline Yield

WASHINGTON, D. C.—Higher production of heating oils and motor gasoline at Rocky Mountain refineries, PAW District 4, was stipulated last week by Administrator Ickes who advised plant operators that inventories of residual fuel oil have increased to a point where manufacturing emphasis can be diverted to the lighter products.

"In view of the firm position of residual oil in District 4, and the indicated need for additional heating oil and motor gasoline there," the administrator wired Rocky Mountain

refiners, "it is now advisable to increase the yields of light products. Therefore, effective immediately and until further advised, the limitation on motor-gasoline yield as established by Davies' directive, July 7, 1942, is hereby removed."

In the revoked directive, gasoline production had been limited to not more than 80 per cent of the average yield during the last half of 1941.

District 4 refiners were instructed by Mr. Ickes to continue maximum production of 100 and 91-octane gasoline, toluene, butadiene and other petroleum war products.

National Stock Pledged On Otis & Co. Offer

CLEVELAND, Ohio — Substantial percentages of three classes of stock of National Refining Co., Cleveland, have been committed to Otis & Co., investment banking firm, which has made a firm offer to other stockholders in the refining concern.

Announcing that it represented a group of investors, financial houses, and oil interests, Otis offered $100 a share for 6 per cent prior preferred stock, $158.67 per share for 8 per cent preferred, and $8 a share for common. Completion of the deal is conditional upon acceptance of the offer by not less than 90 per cent of prior preferred and common stockholders and 66⅔ per cent of 8 per cent preferred stockholders.

National Refining has outstanding 499,110 shares of common, 44,615 of 6 per cent prior preferred and 1,556 shares of 8 per cent preferred.

In its offer, Otis reported that owners of about 261,000 common shares, or 52 per cent, and approximately 42 per cent of preferred stockholders had agreed to sell their holdings.

The company was founded in 1882 by the late J. I. Lamprecht, father of the present board chairman. Financial circles reported that in recent years the company had been affected by increasing competition from other refiners and producers. These sources understood the present management would be retained if the proposed transaction were completed.

Gulf Becomes Buyer in Bayou Couba Field

HOUSTON, Tex. — Gulf Refining Co., crude oil purchasing division, has posted initial prices for crude in the Bayou Couba field, St. Charles Parish, Louisiana. The company posted a gravity table ranging from $1.12 per barrel for below 28-gravity oil to a top of $1.30 for 36 gravity and above.

Sketches of Plant Operators

HOWARD W. SHELDON, who has been with Socony-Vacuum Oil Co., Inc., for 17 years, has been appointed general manager of the company's refinery at Paulsboro, N. J., succeeding Douglas L. Hooker, superintendent at Paulsboro since 1934, who has been elevated to a higher position in the company.

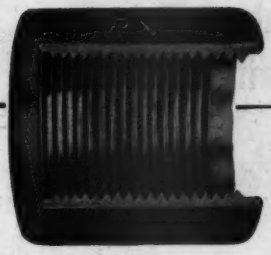
HOWARD W. SHELDON

Mr. Sheldon was born in the oil country, practically in the shadow of one of Socony-Vacuum's refineries at Olean, N. Y., but it was not until 1926 that he became associated with the company. After receiving elementary and high school education in Olean's public schools, Mr. Sheldon entered the University of Michigan. He was graduated in 1917 with a degree in chemical engineering.

Mr. Sheldon's first employment was with the Bureau of Aircraft Production. He served this agency from 1917 to 1919 as chief of iron and steel inspection east of Pittsburgh. From 1919 to 1926 he was associated with several concerns before he became affiliated with Socony-Vacuum.

His first Socony job was that of a refinery engineer at Paulsboro. Three years later he was transferred to New York as a chemical engineer in the manufacturing department and became chief chemical engineer of the research and development department there as well as holding a similar capacity with the Paulsboro laboratories.

Mr. Sheldon returned to Paulsboro in 1933 as chemical engineer and a year later was named assistant superintendent to Dr. Hooker who was at that time appointed superintendent.



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MURRAY
Steam Turbines for
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Geared condensing unit for large centrifugal pump drive consisting of Type UV turbine and 24" center herringbone reduction gear. View shows lagging for UV turbine, vacuum breaker, center line support and oiling system for gear.

MURRAY IRON WORKS COMPANY
BURLINGTON, IOWA

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Inland Waterways Gain Importance

(Continued from Page 27)

and the other movements (within ports and southward or westward).

TABLE 3—DAILY MOVEMENT AND DESTINATIONS

	Barrels daily	To Dist. 1	Other N&E	Other
January	882,456	5.8	87.4	6.8
February	977,739	5.3	86.4	8.3
March	975,059	5.4	87.5	7.1
April	1,114,728	5.8	86.6	7.6
May	1,250,993	9.5	83.9	6.6
June	1,286,398	11.5	83.2	5.3

Important as all the waterway movements are, it is deliveries of petroleum and products into District 1 which holds the greatest interest for most people. These deliveries vary with the seasons, particularly as winter closes navigation on the Great Lakes and the New York Barge Canal. This same factor influences the origin of the oil delivered to District 1, for shipments from District 2 have a heavy seasonal variation, while those originating in District 3 are not affected much by the seasons.

Table 4 shows a 14-month record of waterway deliveries into District 1 of all petroleum and products.

These same figures of total waterway deliveries into District 1 are also broken down to show route of movement, whether via the Great Lakes, the Ohio River and its tributaries, or the Gulf Intracoastal Waterway.

TABLE 4—BARRELS PER DAY INTO DISTRICT 1 BY ALL WATERWAYS

(Figures in Barrels Daily)

1942—	From Dist. 2	From Dist. 3	Total
May	69,032	18,791	87,823
June	71,610	36,416	108,026
July	72,415	40,503	112,918
August	80,729	39,336	120,065
September	84,671	42,403	127,074
October	74,945	45,948	120,893
November	57,310	42,946	100,256
December	15,461	43,272	61,733
1943—			
January	14,324	36,998	51,322
February	11,912	40,174	52,086
March	10,203	42,292	52,495
April	14,248	50,685	64,933
May	68,414	50,686	119,100
June	84,472	64,320	148,792

Figures for more recent months are not available at the present time, but deliveries by way of the Great Lakes are expected to be somewhat higher this summer than last year. And new equipment scheduled to be delivered in the next few months and put into service on the other waterways, particularly the Gulf Intracoastal Waterway, should boost total deliveries to District 1 even during this winter when the Great Lakes are closed.

Deliveries of new barges and towboats will increase total water-borne movements of oil somewhat, but not tremendously. The new equipment, however, will permit much more efficient movement, closer operating schedules, and better integration of waterways with other means of transportation.

Estimates made by the Transportation Division of the PAW are that deliveries to District 1 by way of the Ohio River system will exceed 30,000 bbl. per day this winter and may be close to 50,000 bbl. per day all through 1944. The Gulf Intracoastal Waterway is scheduled for even greater movements, and it is estimated that deliveries to District 1 by way of this route will rise to nearly 100,000 bbl. per day this winter and may exceed that figure during 1944. Total deliveries to District 1 by the three waterways next summer when the Great Lakes are open to navigation, thus are expected to be in the neighborhood of 200,000 bbl. per day.

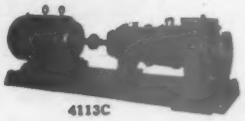
TABLE 5—DELIVERIES INTO DISTRICT 1 FROM DISTRICTS 2 AND 3

(Figures in barrels daily)

	By way of—		
1942—	Great Lakes	Ohio River	Gulf Intra.
May	52,589	22,084	13,150
June	56,149	25,561	26,316
July	56,636	32,105	24,177
August	64,862	30,390	24,813
September	66,325	30,972	29,777
October	58,387	25,916	36,590
November	41,784	27,344	31,128
December	4,653	28,024	29,056
1943—			
January	.....	22,364	28,958
February	.....	19,631	32,455
March	.....	18,227	34,268
April	1,887	20,268	42,778
May	55,403	16,780	46,917
June	72,768	21,850	54,074

PUMPS
CENTRIFUGAL
RECIPROCATING

4162


4113C

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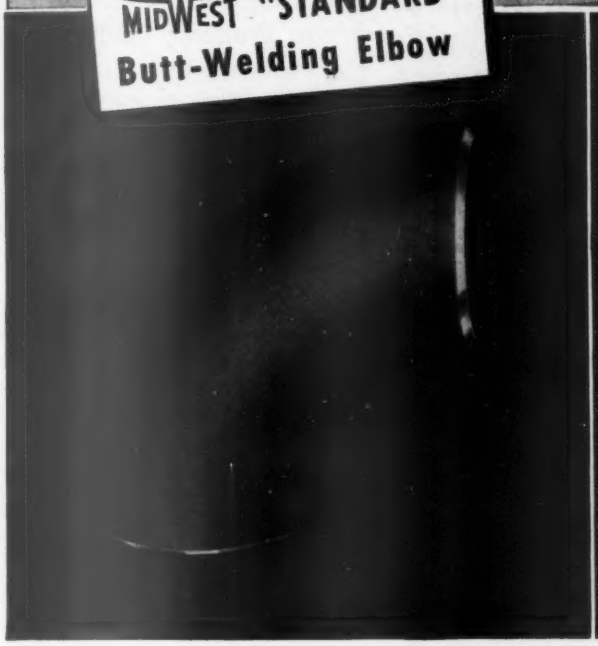

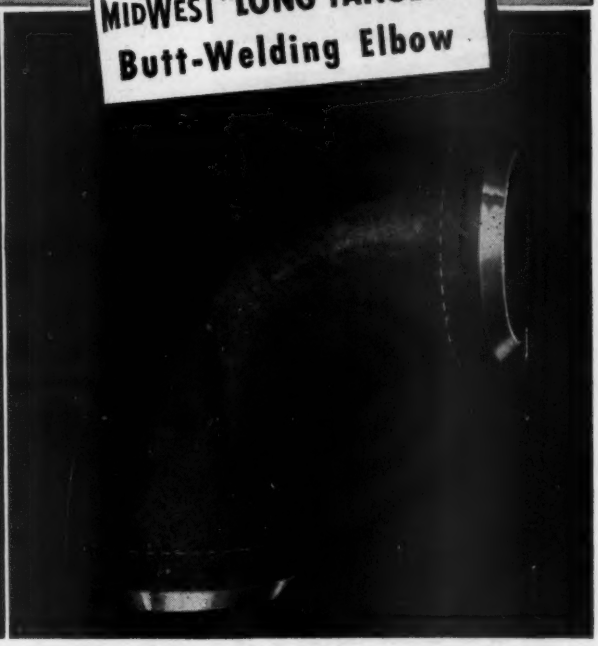

The difference between the two types of welding elbows shown above is in their dimensions. The "American Standard" elbow has a center-to-end dimension equal to one and one-half times the nominal pipe size. The Midwest "Long Tangent" elbow has tangents (straight ends) equal to one-fourth of the nominal pipe size; the center-to-end dimension is one and three-quarters times the nominal pipe size. Important among the advantages of the long tangents are: (1) pipe and fitting more quickly and accurately lined up, (2) weld removed from point of maximum bending stress, (3) less pipe required, (4) short nipple and extra circumferential weld frequently eliminated, (5) slip-on welding flanges easily used, etc. There is no increase in price for Midwest "Long Tangent" Welding Elbows.

Both types of elbows have all other advantages that result from the unique Midwest manufacturing process: final working of metal in compression (which means exceptional dimensional accuracy and uniformity), stress relieving, exact included angle, true circular cross-section and uniform wall thickness. For all the facts about Midwest Welding Fittings, ask for Bulletin WF-41.

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PIPE LINES

WEP 20-In. Products Line Completed to Norris City

All of the pipe has been laid for the leg of War Emergency Pipelines, Inc., 20-in. products line from the Gulf Coast to Norris City, Ill. This includes river crossings and feeder lines originally scheduled to serve the Houston, Beaumont and Port Arthur refinery area. In addition, a 60-mile line will connect the system with the Cities Service Oil Co. refinery at Lake Charles, La.

More than 1,150 miles of 20-in. had been laid of the total 1,485 miles required for the system. Total mileage of pipe of all sizes for the WEP products system is 1,642 miles.

Laying of pipe will probably be completed in November. If station equipment arrives in accordance with present expectations, refined products should reach Norris City in November; and they should arrive at New York by the end of the year. Between 3½ and 4 million barrels will be required for filling the line and necessary storage.

The difficult work of laying a distribution line through the streets of Bayonne, N. J., has been completed for War Emergency Pipelines, Inc., and the 24-in. crude-oil system is being connected with Tide Water Associated Oil Co. refinery facilities. The lateral of the crude-oil line extending from the Phoenixville, N. J., junction will be put in operation as soon as tests are completed on short stretches in the vicinity of the Delaware and Raritan rivers where water pressure is being raised beyond the normal working pressure to insure satisfactory service under abnormal conditions. This testing may be finished this week.

For trenching work in cold Pennsylvania weather at the eastern end of the WEP project, trenchers have been equipped with heated cabs to protect operators

Better Oil Movements Bring Barge Program Reduction

In a new shakeup of its barge program, the Office of Defense Transportation last week ordered 55 craft originally scheduled as oil carriers diverted to dry cargo use on the Mississippi River system.

Joseph B. Eastman, ODT director, said the continued improvement in the petroleum transportation system made possible the transfer.

Cancellation of contracts for 13 steel tank barges was announced at the same time. The revised steel barge program will include 100 tanker barges and the 55 converted to dry cargo. The reduced building program will save 2,400 tons of steel.

The wooden barge program, previously reduced, also was revised by ODT. Contracts for 36 wooden tanker barges were canceled September 9. The new program calls for completion of 159 tankers, with 110 others now under construction to be maintained as a floating reserve for quick conversion to oil or dry cargo as needed.

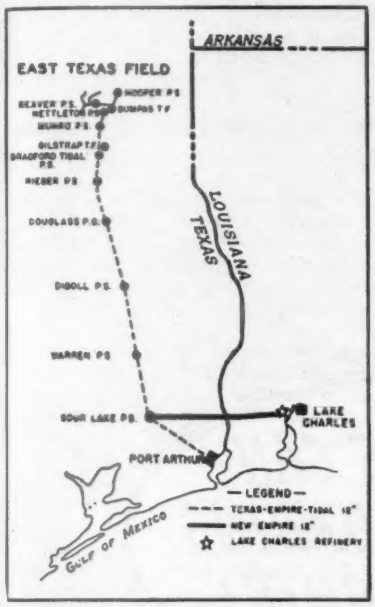
Empire's Lake Charles Line Nears Completion

The Empire Pipeline Co. has acquired ownership of the new 65-mile 12-in. crude-oil pipe line and telephone line which is now under construction to serve the new Lake Charles refinery of Cities Service Refining Corp. The line extends from Sour Lake station of the Texas-Empire-Tidal line to the Rose Bluff (Lake Charles) tank farm, and will carry East Texas crude.

In addition to a heavy coating of enamel and asbestos felt, the line will have cathodic protection applied to its entire length. Three weights of pipe are being used, namely ⅜-in. wall in the river crossings, $\frac{7}{32}$-in. in the swamps, and ¼-in. wall for the remainder. After being welded in 5-joint sections, the swamp crossings were floated across from one end by adding a section at a time. The swamp ditch was blasted out 6 ft. wide. After the pipe was across, it was filled with water to submerge it. The ditch will not be backfilled, al-

lowing the line walker to patrol it by boat.

The line has been completed and will be placed in operation early in October. The initial capacity is 48,000 bbl. per day. Pumping will be done by the Sour Lake station of the Texas-Empire-Tidal line. Arkansas Pipe Line Corp. is supervising construction of the new line.



Connecting line between East Texas trunk system and Lake Charles refinery

Tanks Are Provided for Stanolind's 16-In. Line

Standard Oil Co. of Indiana is dismantling tanks at its Casper, Wyo., farm to provide material for five tanks to be constructed in the vicinity of the Slaughter, Tex., reception point of the 16-in. crude-oil pipe line to be built by Stanolind Pipe Line Co. to Drumright, Okla. These tanks are to be of 80,000 and 85,000-bbl. capacity. Since riveted tanks are being dismantled to provide for the construction of welded tanks, the capacity of the salvaged tanks is considerably larger than that of the tanks to be built. Dismantling and reerection has been contracted by Chicago Bridge & Iron Co. The first bottom was shipped late last week.

Specifications have been issued for the laying of the Stanolind 16-in. line and bids are due October 5. There will be five main-line spreads and a river crossing spread which will lay 18,000 ft. at six river crossings for which the first shipment will be delivered about October 15 consisting of 3 or 4 miles of heavy pipe.

With the decision to add an intermediate station at Bretch, Okla., provision was made for increasing capacity from 54,000 bbl. to 65,000 bbl. daily. By having a total of four stations, capacity could be raised to 83,000 bbl. daily. By looping and the addition of more stations bringing the total number of stations up to six it would be possible to attain a capacity of 116,000 bbl. daily.

Cities Service Lays Gathering Lines

The building of gathering lines in the vicinity of Guymon, Okla., consisting of 60 miles of pipe, 4-in. to 20-in. in diameter, to feed the 231-mile 26-in. gas line of Cities Service Transportation & Chemical Co., is being handled by Anderson Brothers.

This contractor established main headquarters at 503 National Bank of Commerce Building, Tulsa, early this week, where office equipment is being moved from former headquarters at Hamilton, Ohio. The firm's program includes establishment of warehouses at Houston, Tex., and Tulsa. Contract has been obtained from Texas Co., according to reports for having this organization lay 25 miles of 8-in. on the Gulf Coast. This contractor has just completed laying the 65-mile 12-in. crude-oil line from Sour Lake, Tex., to the Cities Service Oil Co. refinery at Lake Charles, La.

Chicago Corp. to Finance Tex.-W. Va. Gas Pipe Line

Since FPC has said that a contract between Chicago Corp. and Tennessee Gas & Transmission Co. constitutes substantial compliance with its requirements for the financing of a 1,228-mile 24-in. natural-gas line from Corpus Christi, Tex., to Charleston, W. Va., estimated to cost $50,000,000, which is to be commenced in December, this year, it is assumed that construction of the project is assured. Affairs of Chicago Corp. are directed by Gardiner Symonds, president, from its headquarters at 135 So. La Salle Street, Chicago. Details of the projected gas line are discussed elsewhere in this issue.

BEHIND THE GUN

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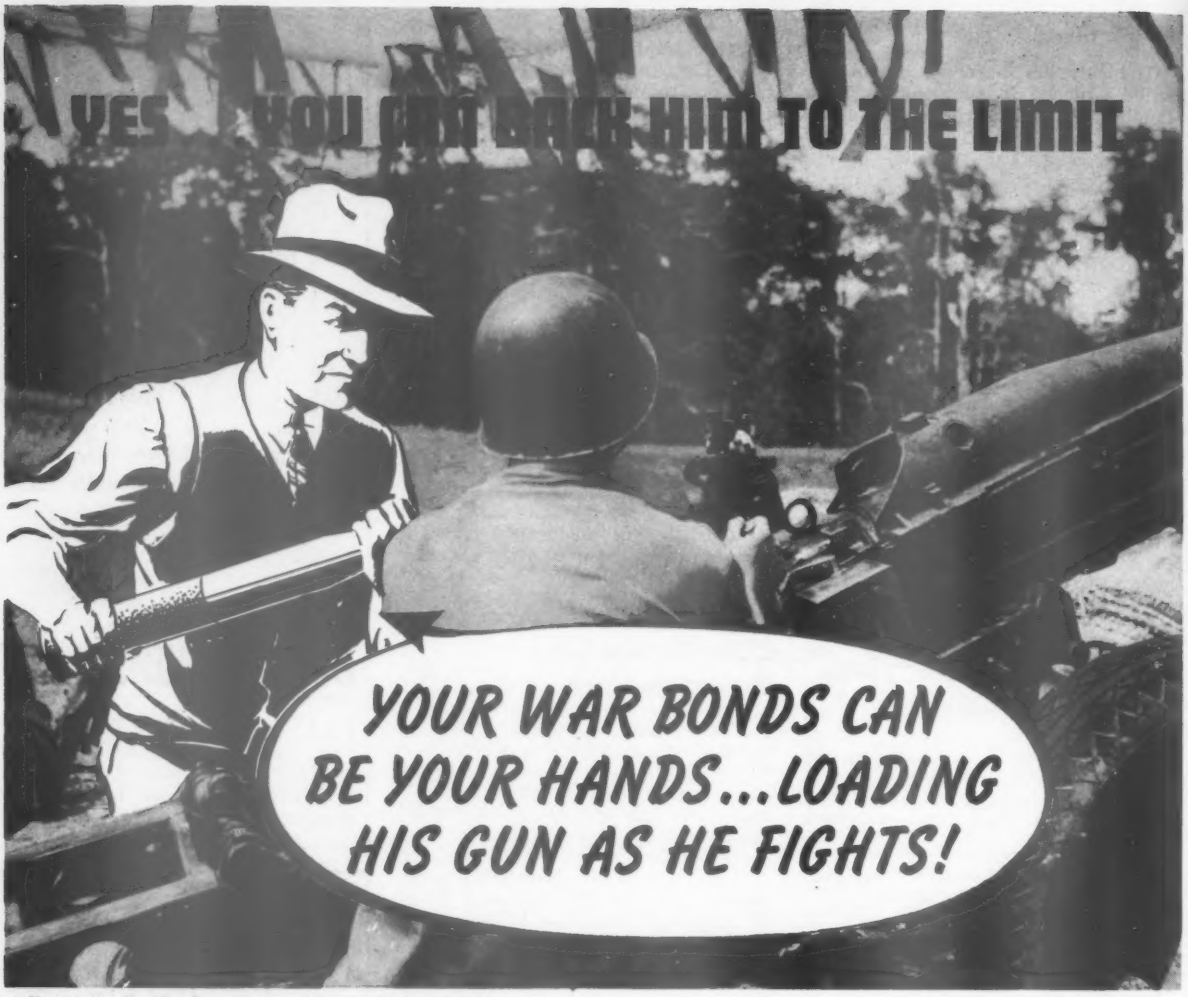

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Natural Gas

Chicago Corp. Takes Over Tennessee Gas Project

The Chicago Corp., which appeared publicly last week for the first time in the Tennessee Gas & Transmission Co.'s 1,200-mile natural-gas project from Texas to West Virginia, is one of the largest cycling-plant operators in the Gulf Coast region. The company has two plants, each having capacity of 120,000,000 cu. ft. daily and various other interests in the South Texas area.

All of the preferred stock and 90 per cent of the common in Tennessee Gas & Transmission Co. was acquired by the Chicago Corp. for $500,000, it was revealed last week by Richard Wagner, president. He announced that the corporation was prepared to spend $12,500,000 on the natural-gas project and finance the remainder of the $50,000,000 program through bank or government loans.

The 24-in. line, formally approved last week by the Federal Power Commission, which previously had been assured by the War Production Board that equipment would be made available for such a project, is expected to deliver approximately 300,000,000 cu. ft daily from Corpus Christi to West Virginia.

Application of Hope Natural Gas Co., Standard Oil Co. (New Jersey) affiliate, for authority to build a 24-in. line from the Hugoton field in Kansas and Oklahoma to West Virginia has been reset for hearing before the FPC on October 5. After FPC approved the Tennessee company's application last week, John J. McGrath, representing the National Coal Association and the United Mine Workers, requested dismissal of the Hope application on the ground that the hearing would be a waste of time in the light of the earlier authorized construction of a competing line.

The FPC examiner said, however, that Hope was entitled to present its case and William A. Daugherty, counsel for the Standard of New Jersey affiliate, opposed outright dismissal of his company's application. He suggested that the Tennessee company might not meet conditions prescribed by the WPB. Mr. Daugherty said no useful purpose would be served in proceeding with extensive hearings until the WPB acts formally. He obviously referred to impending action on priorities for the necessary steel for the Tennessee company's line.

Lt. Col. Curtis B. Dall, former son-in-law of President Roosevelt, resigned as president of the Tennessee Gas & Transmission Co., after the Chicago Corp. purchased controlling interest in the concern. Paul Kayser, Houston, Tex., president of the El Paso Natural Gas Co., acquired a 10 per cent interest in the securities of the Tennessee company taken over by the Chicago Corp., it was reported in Chicago.

Hearing Postponed On United Removal Case

WASHINGTON, D. C.—A Federal Power Commission hearing on United Gas Pipe Line Co.'s application to remove about 31 miles of 18-in. line from an interconnection with the Southern Natural Gas Co.'s system near Benton, Miss., to a point in Madison County, Mississippi, has been indefinitely postponed.

John I. Yellott Becomes Gas Institute Director

CHICAGO, Ill.—John I. Yellott has been appointed full-time director of the Institute of Gas Technology at Illinois Institute of Technology.

Mr. Yellott, who has been chairman of the department of mechanical engineering and director of war training at Illinois Tech, assumed the duties of his new position September 1. He succeeds Harold Vagtborg as director of the Gas Institute.

J. I. YELLOTT

Mr. Yellott has been chairman of Illinois Tech's mechanical engineering department for the past 3 years and became director of the war training program in 1941.

An honor graduate in mechanical engineering of John Hopkins University, Mr. Yellott was former chairman of mechanical engineering at Stevens Institute of Technology and a member of the mechanical engineering faculty at the University of Rochester. He has also served as an industrial consultant in power and steam flow.

In 1939 Mr. Yellott was named the outstanding mechanical engineer of the past decade by Pi Tau Sigma, honorary mechanical engineering fraternity.

Established to provide a central research and educational service for the entire gas industry, the Institute of Gas Technology has expanded its educational, research and library services to an annual budget of almost $200,000. The gas institute now has a fellowship group of 21 post-graduate students training for specialized technical service in the gas industry.

In addition, it has underway a number of research projects for its various member companies as well as several long-range fundamental research programs established for the general benefit of the entire gas industry.

A.G.A. Postpones Meeting Until October 26, 27 and 28

NEW YORK.—Conflict of dates in St. Louis with the World Series games has resulted in such congestion in hotel and travel facilities as to make necessary a change in the dates for the annual meeting of the American Gas Association. The executive board last week decided that the twenty-fifth annual meeting shall be held at the Jefferson Hotel in St. Louis, October 26, 27 and 28.

All members are advised to cancel present rail reservations and make new ones promptly. Hotel reservations previously confirmed will be honored for the new dates, if reconfirmed direct to hotel within a period of 7 days giving new date arrival.

As far as possible the meetings will be arranged in the same order and the same relative times as previously for the original dates.

Natural Gasoline

Output Gains in Two States Offset by Losses Elsewhere

WASHINGTON, D. C.—Increased production of natural gasoline and allied products in July in the Texas Gulf Coast, East Texas and in California was offset by declines in other areas, leaving the daily average output of 235,000 bbl. for that month unchanged from June. Average production for the first 7 months this year was 236,000 bbl. daily, compared with 225,000 bbl. a day for the same period in 1942.

Daily average demand for natural gasoline and allied products declined to 254,700 bbl. in July, compared with 258,900 in June, the Bureau of Mines reported last week.

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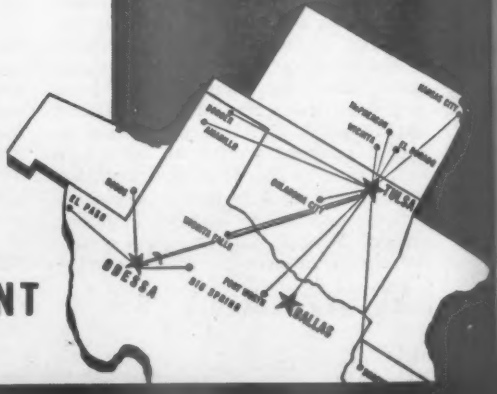

SERVICE THAT *Covers* THE MID-CONTINENT

Exploration and Drilling

Week's Highlights

STATISTICS are often a poor basis for arguments, particularly if they omit details, or if only those figures which confirm a particular point of view are used. There is much comment over Sumner Pike's recent testimony to the effect that there is more wildcatting now going on than there ever was, despite the low price of crude that now obtains. He estimated that 3,300 wildcats would be drilled this year, which is about 1 per cent above the record for 1941.

Actually, if the wildcat completions reported last week can be taken as a basis for the last half of 1943, statistics show a great increase over the first half year, when there were only 1,420 wildcats drilled. They also show that outside of the Appalachian area, wildcatting is now at the rate of around 4,000 wells a year (p. 91). The implication that this is an argument against price increase does not, however, stand up.

Wildcatters are of necessity optimists and a very good case could be made out for the viewpoint that not only do they expect to find oil but they also expect to be just in time to benefit from the price increase that they feel to be inevitable.

The total figures do not give a proper index of wildcatting, nor does the fact that many wildcats are now being drilled have much bearing on the status of the industry. No matter how many there are, the record of discoveries shows that there are not enough. Reserves today stand at the lowest level since 1938 and there is no reason to believe that 1943's discoveries will equal production. Nor is there any indication that the wildcats are being drilled with the idea of bringing in large new fields. For example, in Texas, 550 out of the 813 wildcats drilled this year are in the north central and southwestern districts where the average discovery is smaller than the average on the Gulf Coast or in West Texas. The wells are shallower and, therefore, cheaper to drill. Counting these two areas, Illinois, Kansas, Oklahoma, Indiana, Michigan and Kentucky, two-thirds of the nation's wildcats are in shallow areas where there has already been much drilling and where a discovery with more than 5,000,000 bbl. is a rarity in recent years.

The individual wildcatter does not need to bring in a big field to show a profit. He merely needs to bring in a good well. Under present economic conditions, he prospects in areas where the costs are low and where his chance of finding something are greater than average. Hence, the high total of discoveries this year and the relatively low average depth of wildcats.

Mr. Pike's testimony would have been more valuable had he pointed out some of these facts. Similarly, the president's statement that oil production has risen 66 per cent is not altogether a matter to which we can point only with pride. If production rises 66 per cent over a period of time and the reserve necessary to maintain that production dwindles, something more than looking at figures is necessary. This is particularly true if the month chosen for comparison was August 1939 when there was a nation-wide shutdown.

Plans to import 1,000,000,000 bbl. of oil next year, as some favor may not be to the best advantage of the American oil industry but the most interesting fact is that this is approximately 400,000,000 bbl. above the total world production outside of the United States, and it is hardly conceivable that Soviet Russia and the Axis countries will use all of their production for this purpose.

On page 91 is a survey of wildcat completions reported last week and an appraisal of their significance. This feature will be continued weekly.

COMPLETIONS IN ALL FIELDS . . .

(Week ended September 25, 1943)

	Oil	Gas	Dry	Total	Footage	Total Comb. to date 1943	Total Comb. to date 1942
N. Y., Penna., W. Va.	49	16	7	72	141,277	2,504	2,522
Ohio	4	14	7	25	54,541	662	820
Indiana	0	0	0	0	0	163	240
Kentucky	5	9	4	18	34,117	303	152
Illinois	26	0	11	37	99,215	1,275	1,268
Michigan	8	1	4	13	31,603	431	517
Kansas	26	0	20	46	159,388	1,194	1,145
Nebraska	0	0	1	1	539	23	28
Missouri, Iowa	0	0	1	1	2,321	12	10
Oklahoma	10	1	16	27	96,534	875	987
Texas:							
North Central Texas	20	0	15	35	109,439	1,056	838
West Texas	21	0	1	22	85,802	631	1,048
Texas Panhandle	2	0	0	2	6,328	133	274
Eastern Texas	2	0	6	8	44,443	211	299
Texas Gulf Coast	6	0	5	11	69,076	332	544
Southwest Texas	7	1	9	17	73,790	669	799
Total Texas	58	1	36	95	388,778	3,031	3,802
North Louisiana	1	1	3	5	18,857	226	348
Louisiana Gulf Coast	3	0	2	5	41,307	265	370
Total Louisiana	4	1	5	10	59,164	491	718
Arkansas	1	0	3	4	13,094	180	134
Mississippi and Southeast	0	0	3	3	7,956	62	46
Montana	3	1	3	7	15,557	160	146
Wyoming	4	0	0	4	21,123	101	78
Colorado, Utah	0	0	0	0	0	18	15
New Mexico	8	0	1	9	29,181	164	178
California	19	1	2	22	74,415	958	541
Total United States	225	45	124	394	1,228,803	12,607	13,247
Total previous week	200	36	143	379			
Week ending Sept. 26, 1942	177	39	123	339			

Who Should Mine Coal For Petroleum Synthesis?

Letter From Frank C. Greene

The Editor,
The Oil and Gas Journal,
Dear Sir:

"Now and then the writer reads your sane editorials regarding an expectable, eventual lack of petroleum from continental reservoirs. Long attached to the coal industry, grass roots up and down, he has not been idle preparing that industry for the day of petroleum exhaustion. The near future hiatus in long peak crude discovery, discernible by the petroleum industry finds it now willing to consider how to supplement production wane. It is loath to handle solid hydrocarbons.

"Importantly, the coal industry, employing its ancient methods of producing dominantly lump coal, cannot supply the raw substance for conversion to coaleum . . . petroleum from coal. Another 600,000,000 tons of coal would be required annually; and the coal industry has neither miners, machines, methods for the task.

"Thus a purely technical problem is transposed to one of business: Query: Whose business will it be to convert coal to coaleum? The oil industry says it will not mine coal. The coal industry knows it cannot supply coal by using past methods. Yet both want the business.

There is much doubt in the minds of many observers whether the oil discovery rate will again rise. Consequently, government agencies, major companies and independents are studying the question of possible substitutes. The accompanying letter from Frank C. Greene, of Oakland, Calif., is published here, together with comments by the field editor as providing some additional information on this much-debated question.

"This writer believes that the oil wildcatter who has conserved his capital should be nominated for the job. But he has not even heard of it; hence it may be well he should be informed as now is proposed.

"Can coal be handled from the face of the mine through the conversion plant in manner as fluids are handled? It can, providing but two new, and radical, equipments are employed. The wildcatter is familiar with his rotary drill. That implement, suitably devised as it has been, will take dustless grains of coal from the mineface and transport them via pipe line, miles if need be, to the surface plant where, after conditioning, the second implement converts them to liquid hydrocarbons. This second implement, the converter, is at hand.

"The resulting crude coaleum will be on parity with well-head price of crude petroleum ($1.50 to $2.00.) The refining, which the oil industry will find comparable to present oils, is the province of that industry. Its marketing continued as at present. The mining and conversion thus of coal will cost far less than with technics now used . . . both in capital costs and operating costs.

"The background of writer for such radical previsions may be asked. He has studied, designed, built, operated the elemental equipment on large scale. Geologist and technical adviser for Jim Hill, innumerable colliers, smelter concerns and latterly research director with Old Ben Coal Corp. (third largest in world)."

Comment

The first thought aroused by Mr. Greene's letter is that his estimate of the cost of what he calls "coaleum," that is, oil from coal, is much lower than commonly accepted estimates. However, these estimates vary widely and it is possible that the methods suggested by Mr. Greene would bring oil from coal into competition with other methods. Recent reports give the following ranges:

Gasoline from:	B. H. Weil before Interstate Compact Commission (cents per gal.)	W. S. Farish before House Committee on Mines and Mining (cents per gal.)
Shale hydrogenation of oil	5-12	5.5
Fischer - Tropsch method from gas	9-12	
10% alcohol blend	10	
Hydrogenation of coal	16	22.6
Fischer - Tropsch method from coal	18	19.2

The present concensus is that substitute sources in order of probable exploitation are (1) shale, (2) tar sands of the Athabaska River, (3) gas and (4) coal.

Mr. Greene's statements regarding the inability of the coal industry to supply the extra coal leads to some interesting considerations. In the first place, the chances are that the coal which will eventually be used will not come from the older mining areas. Because of the depth of the mines, these are high-cost operations. Their high mining costs are, however, balanced by their proximity to markets and the high quality of the coal mined. Neither of these factors greatly affects oil from coal. The coal will not be transported from the mine to the centers of industry, but will be converted into oil near the mine. The only transportation involved will, thus, be that of the liquid synthetic petroleum or products.

In the interior coal basin of Okla-

DAILY AVERAGE PRODUCTION FOR WEEK

	Sept 25 crude oil	Distillate, allied products	Sept. PAW quota all oils	Sept. 18 crude oil
Arkansas	76,285	4,000	80,100	77,345
California	770,150	46,000	835,000	788,150
Colorado	7,520	.....	6,500	6,950
Eastern fields	76,450	6,000	86,600	74,250
Illinois	217,500	11,500	222,800	227,500
Indiana	14,950	.....	13,800	14,100
Kansas	296,150	4,900	300,000	296,900
Kentucky	27,675	2,200	25,500	22,550
Louisiana	359,985	27,000	375,000	360,825
North Louisiana	81,485	.....	.....	82,325
Louisiana Gulf Coast	278,500	.....	.....	278,500
Michigan	59,100	100	60,100	58,600
Mississippi	48,925	.....	50,000	48,825
Montana	22,180	300	23,300	22,015
Nebraska	1,800	.....	2,000	1,800
New Mexico	109,375	5,400	116,600	105,000
Oklahoma	325,250	27,000	347,000	327,350
Texas	1,838,150	116,000	1,909,000	1,837,650
East Texas	380,000	.....	.....	380,000
West Texas	333,500	.....	.....	333,500
North Central Texas	140,600	.....	.....	140,600
East Central Texas	131,200	.....	.....	130,700
Texas Panhandle	104,000	.....	.....	104,000
Texas Gulf Coast	654,800	.....	.....	654,800
Southwest Texas	94,050	.....	.....	94,050
Wyoming	104,350	2,000	98,800	98,900
Total United States	4,355,795	252,400	4,552,100	4,368,710

Total production January 1-September 25, 1943 ..... 1,075,838,735 bbl.
Same period last year ..... 1,016,502,610 bbl.

Completions Increase in August

TOTAL completions were up in August in comparison with the previous month although the number of oil wells was 29 less. Completions and oil wells were up considerably over the same period last year. The number of drilling wells was up 93 in August. This increase in operations was spread over the Appalachian area, Ohio, Kentucky, Oklahoma and California. In contrast, the various areas of Texas showed a combined reduction of 32 completions.

In comparison with last year, the total operations represent an increase of 19.5 per cent, while oil wells have increased 11 per cent. Active wells were up 19 per cent over last year.

SUMMARY OF OPERATIONS, AUGUST 1943

	Comp.	Oil	Prod.	Gas	Dry	Under 1,000 ft.	1,000-2,500 ft.	2,500-5,000 ft.	5,000-10,000 ft.	Over 10,000 ft.	Footage	Rigs and drlg.
Appalachian	*278	187	384	65	26	2	45	226	5	0	541,266	384
Ohio	100	18	803	38	44	14	32	53	1	0	250,083	198
Indiana	21	3	48	1	17	3	14	4	0	0	35,837	46
Kentucky	61	16	2,360	12	33	18	31	12	0	0	143,350	143
Michigan	61	27	5,861	10	24	4	32	25	0	0	154,724	114
Illinois	148	79	10,543	0	69	2	60	86	0	0	372,992	183
Kansas	143	77	20,450	2	64	0	12	131	0	0	478,646	249
Nebraska	2	1	80	0	1	0	1	1	0	0	6,000	2
Missouri, Iowa	1	0	0	0	1	1	0	0	0	0	498	2
Oklahoma	119	49	7,043	5	65	8	34	59	18	0	373,997	306
North Texas	129	55	22,427	0	74	17	56	48	8	0	311,199	67
West Central Texas	25	8	3,797	1	16	2	7	15	1	0	66,469	18
West Texas	72	59	33,438	0	13	0	9	42	21	0	333,606	127
Texas Panhandle	19	12	995	1	6	0	1	17	1	0	64,326	13
East Texas	33	14	5,795	0	19	0	1	18	14	0	196,768	21
Upper Gulf Coast	39	19	6,331	1	19	0	0	6	30	3	268,535	83
Lower Gulf Coast	34	20	3,673	1	13	0	0	7	27	0	203,932	106
South Central Texas	4	0	0	0	4	2	1	0	1	0	9,015	19
South Texas	31	13	1,395	2	16	0	4	18	9	0	130,556	72
Southeast New Mexico	22	13	3,324	0	9	0	2	17	3	0	85,129	28
Arkansas	26	10	1,455	0	16	0	3	13	10	0	96,006	50
North Louisiana	27	9	1,265	11	7	0	12	8	7	0	100,006	58
Louisiana Gulf	29	14	2,976	1	14	0	3	1	16	9	242,653	101
Mississippi	3	0	0	0	3	0	1	0	2	0	19,617	23
Montana	25	13	714	3	9	2	15	8	0	0	50,340	98
Wyoming	18	13	7,863	1	4	0	3	10	5	0	79,935	79
Colorado, Utah	2	0	0	0	2	0	2	0	0	0	2,500	30
Northwest New Mexico	0	0	0	0	0	0	0	0	0	0	0	13
California	137	98	18,615	3	36	7	53	51	23	3	461,384	160
Alabama	1	0	0	0	1	0	0	0	1	0	5,410	1
Total August	1,610	827	161,635	158	625	82	434	876	203	15	5,084,781	2,788
Total July	1,552	856	160,610	143	553	85	552	672	224	19	4,978,490	2,695
August 1942	1,347	745	180,732	181	421	68	402	615	240	22	4,643,136	2,337

*Does not include 149 input wells.

homa and Missouri there are large deposits which are not now being mined and in the Great Plains, there is the largest coal reserve in the world in practically virgin territory which cannot now compete with coal, even in the districts in which it is found. From the standpoint of conversion into oil, however, these low-grade coals occurring almost at grass-roots in many areas are as good as many higher-ranking coals.[1] Moreover, their ability to produce oil can be foretold following chemical and petrographic analysis.

It may be years before oil can be produced from coal to compete with naturally occurring petroleum but there is no reason, as Mr. Greene suggests, why the oil man, who is eventually going to operate this industry, needs to follow conventional methods of mining or even to stick to conversion processes as worked out in Europe. If he finds a process which is economically feasible, he does not need to go into Pennsylvania and start mining Pittsburgh coal. He can operate near home in low-cost areas.

[1]Hydrogenation and Liquefaction of Coal. Bur. of Mines, Tech. Paper 642, abstracted in The Oil and Gas Journal, Jan. 21, 1943.

PERMIAN BASIN

Fullerton Extension Well Being Tested

MIDLAND, Tex.—Production test was to be made at Mid-Continent Petroleum Corp. 1-B University, NW NE Section 16, Block 13, University Survey, 2½ miles southeast of nearest producer in the Fullerton pool, Andrews County. The test cored from 6,892 to 6,907 ft., recovering 7 ft. The top 4 ft. was dense dolomite with oil stains, and the bottom 3 ft. good saturated formation with porosity. Operators were preparing to set 5½-in. casing for the test. Possibility of the new strike being on the same structure as the Fullerton pool seems likely, as the largest wells in the pool are on the south edge. In southeast Andrews County, Texas Co. 1 John Mabee, NE SW Section 37, Block 40, G.&M.M.B.&A. Survey, continued to show favorable for opening a new San Andres lime pool. Seven-inch casing was set at 4,636 ft., cemented with 350 sacks, and 2-in. tubing was run to total depth 4,701 ft.

Winkler County.—The long dormant Hill pool was extended ½ mile east by Superior Oil Co. 2 Hill, NW SW Section 19, Block B-11, Public School Land, which was completed for an initial potential of 163.33 bbl. of 33.1-gravity oil from pay at 3,191-94 ft. Production gage on Richardson & Bass 4 J. B. Walton, old well drilled deeper to the Holt horizon of the Clear Fork lime zone, showed 251 bbl. oil per day from perforations 4,705-20 ft. This well opened the third producing horizon for the Keystone pool.

Pecos County.—New depth record for West Texas was set by Phillips Petroleum Co. 1 Ada Price, 27 miles southeast of Fort Stockton, when it passed the old record of 12,706 ft. held by Gulf Oil Co. 103 McElroy, Upton County. The Phillips test was drilling ahead below 12,830 ft.

WEST TEXAS WILDCAT COMPLETIONS

Winkler County, new pay, Keystone pool: Richardson & Bass 4 J. B. Walton, 440 ft. from S & W, Sec. 5, Blk. B-2, Public School Land, flow 251 bbl., Holt pay, Clear Fork, perf. 45 shots 4,705-20 ft., acid 500 gal., drilled deeper from O.T.D. 3,376 ft. to T.D. 4,900 ft.

Superior Oil Corp. 2 M. J. Hill, semi-wildcat, Hill pool, 1,980 ft. from S, 660 ft. from W, Sec. 19, Blk. B-11, Public

School Land, I.P. 163 bbl. 33.1° gravity, lime pay 3,191 ft., T.D. 3,194 ft.

TEXAS PANHANDLE

AMARILLO, Tex.—In Donley County, Shamrock Oil Co. 1 Adair estate, Section 15, Block A, J. G. Adair Survey, total depth 5,358 ft., perforated 5½-in. casing with 18 shots from 4,713-20 ft. and filled up 300 ft. with drilling mud and was cleaning out.

In Collingsworth County, Jenkins & Portman 1 Bell, wildcat test, was showing estimated 3,000,000 cu. ft. of gas from 1,995 to 2,152 ft., with an oil show from dolomite at 2,172-75 ft., total depth 2,235 ft.

SOUTHEAST NEW MEXICO

HOBBS, N. M.—Wildcatting in the Southeast New Mexico district is on the upturn. In western Eddy County, Standard Oil Co. of Texas has spudded two new tests. Its 1-23 Smith is 990 ft. from the north and 1,650 ft. from the west lines, 23-22s-24e, 12 miles west and 2 miles south of Carlsbad, and 1-3 H. H. Wilson is in the center SW SE 3-22s-25e, 8 miles due west of Carlsbad. Both are to test the Delaware at about 2,800 ft.

SOUTHEAST NEW MEXICO WILDCAT COMPLETIONS

Eddy County: Schuster & Messinger 1 Page, SW NW Sec. 15-21s-28e, elev., 3,287 ft., pump 20 bbl., Delaware sand pay 2,638 ft., shot 120 qt. 2,633-49 ft., black lime 2,315 ft., Delaware 2,350 ft., T.D. 2,649 ft.

N. CENTRAL TEXAS

Marble Falls Production Found in Young Co. Wildcat

WICHITA FALLS, Tex.—Allen Guiberson et al 1 H. R. Montgomery, 330 ft. from the south and west lines, Block 19, T. H. Smith Survey, 9 miles southeast of Graham, Young County, opened a new pool from the Marble Falls lime when it flowed 87 bbl. of oil in 8 hours through ½-in. choke on tubing. Saturated Marble Falls lime was topped at 3,917 ft., with hole bottomed at 3,920 ft. The new strike is 2 miles northeast of Lupton & McLester 1 Johnson, Drew Survey, which opened new Marble Falls production last week.

Another good well from the Mississippi lime in the Padgitt pool was completed at R. C. Lipscomb 2 S. L. Scott, which followed at the daily rate of 672 bbl. oil from pay at 4,688 to 4,750 ft., total depth.

Final completion of the new pool opener north of Loving, British-American Oil Producing Co. 1 Carpenter-Barrett, shows it flowed 183 bbl of oil and 196 bbl. of water from Mississippi lime pay at 5,180-95 ft.

Wilbarger County.—A new Ellenburger pool was opened by W. T. Waggoner estate 1-PP fee, 2,310 ft. from east, 2,640 ft. from south lines of Thos. D. Purnell Survey, 2 miles northwest of the Consolidated pool. The new strike flowed 1,080 bbl. per day of 41-gravity oil from Ellenburger pay at 4,356-68 ft., after 2,000-gal. acid treatment.

Montague County.—C. E. Rodgers 1 Edna Neeld, wildcat 1½ miles south of Fruitland, in Section 90, Panola County School Lands, topped dry Marble Falls lime at 6,084 ft., and topped Simpson at 6,818 ft., and was drilling below 7,200 ft. in dry dolomite. Continental Oil Co. H. C. Gadberry, 1 mile east of the Hildreth Simpson and Bend Conglomerate pool, was a disappointment in the Simpson when it showed 870 ft. salt water on 1-hour drill stem test from 7,202 to 7,310 ft., and probably will be plugged back to the conglomerate for completion attempt.

NORTH TEXAS WILDCAT COMPLETIONS

Archer County: G. E. Kadane & Sons 1 J. R. Parkey, 3,300 ft. from N, 1,980 ft. from E, Sec. 1, S. P. Ry. Sur., dry, T.D. 1,750 ft.

G. E. Kadane & Sons 1 W. P. Ferguson, 330 ft. from S. & E., Sec. 1, S. P. Ry. Sur. A-417, 2 miles SW Holliday, Caddo 4,495 ft., Ellenburger 4,852 ft., dry, T.D. 5,119 ft.

Clay County: W. H. Spradling 1 Mrs. Sophie Ferguson, 550 ft. from S, 950 ft. from W, 120-acre lease, Blks. 34 and 35, Byers Bros. Subd., dry, T.D. 1,165 ft.

Jack County: Standard Oil Co. of Texas and Hanlon-Buchanan 1 Emma Sutherland, 660 ft. from S & W of N½ Sec. 2, S. P. Ry. Co. Sur., Caddo 4,926 ft., S.S.O. 3,598-3,622 ft., dry, T.D. 5,444 ft.

Wilbarger County: W. T. Waggoner est. 1-PP Waggoner, 2,310 ft. from E, 2640

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ft. from S, 640-acre lease, Thos. D. Purnell Sur., elev. 1,138 ft., flow 1,080 bbl., 41 gravity, ¼-in. choke, Ellenburger pay 4,356-68 ft., acid 2,000 gal., T.D. 4,384 ft. Discovery.

Whitaker Oil 1 Keith Berry, 330 ft. from N & E, Sec. 9, Blk. 12, H.&T.C. Ry. Sur., dry, T.D. 4,525 ft.

Young County: British-American Oil Prod. 1 Carpenter-Barrett unit, 330 ft. from S & E, N 56¼ acres of S 225 acres of E 450 acres, E. W. Sergent Sur., 2¾ miles N of Loving, flow 183 bbl. 44.1-gravity oil, 196 bbl. water, Mississippi lime pay 5,180-95 ft., perf. 5,180-95 ft., Ellenburger 5,410 ft., T.D. 5,530 ft. Discovery.

Lupton & McLester 1 C. W. Johnson, 660 ft. from N & W, F. M. Drew Sur. A-1,417, 3 miles SE Oil City, flow 1,138 bl., 41° gravity, Marble Falls pay 3,990-4,007 ft., T.D. 4,007 ft.

WEST CENTRAL TEXAS

ABILENE, Tex.—The Silver Valley pool registered an Ellenburger failure when States Oil Corp. 2-B Hudson, Section 22, Block 2, T.&N.O. Ry. Survey, was abandoned at total depth 4,170 ft. Plans to deepen and dual complete 16 wells in the Wimberly pool and the Reddin pool of Jones and Taylor counties were being made.

WEST CENTRAL TEXAS WILDCAT COMPLETIONS

Coleman County: Hunter & Hunter 2 Dorothea Griffin, 600 ft. from S, 2,310 ft. from W, 720-acre lease, Hood County School Land, dry, T.D. 3,962 ft.

Comanche County: P. T. Fullwood & John Bryant 1 Morgan est., 150 ft. from S & W, 80-acre lease, E. T. Ry. Sec. 2, dry, T.D. 718 ft.

APPALACHIAN FIELDS

Deep West Virginia Wildcat Finds Gas

PITTSBURGH, Pa.—From Tucker County, West Virginia, comes important news that the Ohio Oil Co. has struck some gas in the deep wildcat being drilled on the Kaemmerling tract in Dry Fork district. The hole has been held up for some weeks with a bad fishing job in the 6⅝-in. hole at a depth of 7,744 ft. After cementing in the tools and finally being successful in drilling by them at 7,750 ft., a volume of 700,000 cu. ft. of gas was gaged from an undetermined formation. As the Brown shale was placed at about 6,600 ft., and possibly the Burkett shale at 7,100 ft., it is not believed that it is in the Oriskany sand. Some chert, however, was blown out of the hole by the gas which may indicate that it is in the Onondaga lime (Corniferous) or a stringer of chert above the lime. It is, however, definitely in the Marcellus section. The test is located about 5 miles southeast of the town of Davis on U. S. Route 32. The third day's gage, after blowing open, was 400,000 cu. ft. with the lost tools dislodged and back in the hole. Fishing is continuing.

EASTERN TEXAS

Pettit Production in Prospect East of East Texas Field

DALLAS, Tex.—Beacon Oil & Refining Co. 1 J. H. Allen estate, 660 ft. from the north and northeast lines of a 140-acre tract and approximately 2,200 ft. from the west and 2,250 ft from north lines of the Taylor Brown Survey, 3½ miles northwest of Henderson, in Rusk County, deep wildcat prospect, seems to have opened a new Pettit lime producing area for East Texas, east of the East Texas field. Some estimates on the potentialities of the well run as high as 700 bbl. per day. The well was drilled to 7,377 ft., corrected, with 5½-in. casing set on bottom, perforated with 140 shots from 7,250-64 ft., and acidized with a total of 5,000 gal. In a 1-hour test, the well flowed 24.05 bbl. through ¼-in. choke, 17 bbl. the second hour, and 37.7 bbl. the next 3 hours. At the end of 24 hours, a total of 231.84 bbl. of 43-gravity pipe-line oil had been produced. Casing pressure was 750 lb. and tubing pressure 340 lb. at the end of the test.

Wood County.—Jackson & Fisher 1-A McCarley, Oak Grove area Wood County, failed to flow after perforat-

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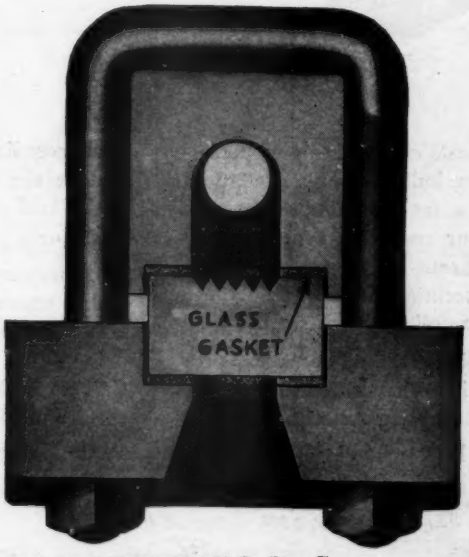

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ing casing with 49 shots from 5,413-26 ft., opposite showings of oil in Woodbine sand, but heavy black oil did rise to within 2,000 ft. of the top of the hole. Swabbing did not recover but 50 ft. of the fluid, since the swab would not penetrate the heavy fluid.

EAST TEXAS WILDCAT COMPLETIONS

Angelina County J. R. Meeker 1 John Massengill, 609 ft. from NW, 715 ft. from NE, 25-ac. tract, 2,000 ft. from SE, 5,650 ft. from SW, Santiago Erie Sur., 2½ mi. NW of Homer, elev. 298 ft., dry, T.D. 4,795 ft.

Bell County W. F. Collins 1-A S. S. Nelson & B. F. Cross, 660 ft. from NE, 510 ft. from NW, Maximo Moreno Sur., 3 mi. S of Temple, elev. 599 ft., dry, T.D. 530 ft.

Cass County: Sohio Prod. 1 Sloan-Taylor, 1,334.5 ft. from S, center E & W lines 120-ac. tract, 1,334.5 ft. from S, 800 ft. from W, Howard Reams Sur., elev. 295 ft., Goodland 3,965 ft., Paluxy 3,995 ft., Pettit 6,947 ft., Travis Peak 7,100 ft., dry, T.D. 7,129 ft.

Hunt County: Stanolind Oil & Gas 1 Mrs. I. W. Bickley, 1,600 ft. from N, 300 ft. from W of tract, 2,300 ft. from S, 1,200 ft. from E, E. F. Anderson Sur., 1⅞ mile SW of Commerce, elev. 498 ft., Pecan Gap 1,236 ft., Austin 2,777 ft., Eagleford 2,910 ft., Georgetown 4,562 ft., Fort Worth 4,920 ft., massive anhydrite 5,410 ft., Travis Peak 5,938 ft., dry, T.D. 5,992 ft.

TEXAS GULF COAST

Oil Sand Topped in Jackson County Wildcat

HOUSTON, Tex.—W. L. Pickens topped a sand showing oil at 5,696 ft. in his Jackson County, Texas, wildcat, 1 J. Kramer, in the J. A. Pierce Survey. Total depth is 5,704 ft. A 10-minute drill-stem test through ¼-in. choke with perforations at 5,701-4 ft. showed 155-lb. working pressure and recovered 1,600 ft. of 35-gravity oil and 30 ft. of mud and sand. Bottom-hole flowing pressure was 2,500 lb. and shut-in bottom-hole pressure 2,600 lb. An electrical survey was run to 5,569 ft. It was said the operator would drill ahead to 6,500 ft.

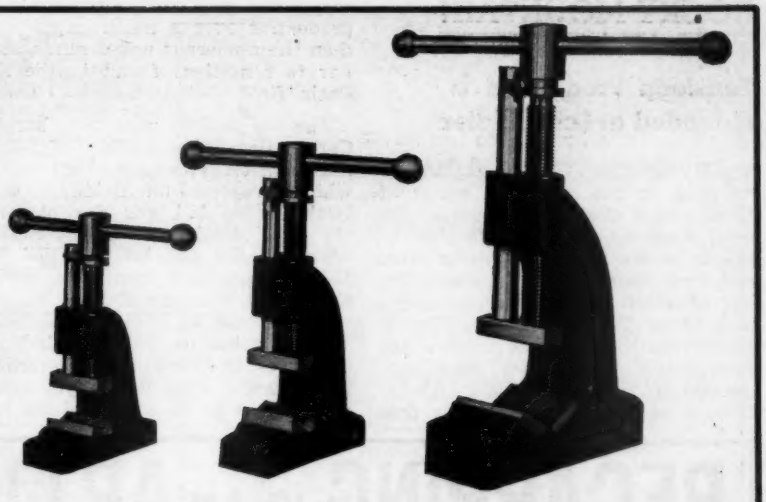
Brazos County.—L. A. Grelling 1 E. U. Peters, 9 miles east of Bryan, was shut down for orders at total depth of 3,170 ft. It ran an electrical survey from 2,470 ft. It topped the Carrizo at 2,810 ft.

Liberty County.—W. W. West was drilling at 7,981 ft. in shale and sandy lime at 1 West et al, in the Davis Hill dome area. It topped the Discorbis at 3,864 ft., Heterostegina 3,981 ft., Frio 4,071 ft.

Polk County.—Humble Oil & Refining Co. was drilling at 2,030 ft. in shale and sand at 3-B W. T. Carter & Brothers, 3 miles northwest of the Segno field.

TEXAS GULF COAST WILDCAT COMPLETIONS

Brazoria County: Rowan Drilling Co. 1 S. Mixson, ½ mi. W of Pearland, dry at 7,861 ft.



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However, ENSIGN Carburetors for Natural Gas, Butane-Propane and Gasoline are still available for uses not directly connected with the war effort. It may take us a little longer than usual to supply the demand for carburetors, but quick delivery of emergency parts is assured.

Now, as always, ENSIGN is unequaled for efficient and economical carburetion.

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Prepare, NOW, for post-war demands. Our competent engineering staff is at your service.

ROCKY MOUNTAIN

Tensleep Production Is Extended at Lost Soldier

DENVER, Colo.—The Lost Soldier field, in the northeast corner of Sweetwater County, Wyoming, the most remarkable field in several respects in the Rocky Mountain area, had two completions of importance, one of which extends the productive area of the Tensleep horizon ¼ mile to the northwest and the other approximately ½ mile out from production on the east flank. A special feature of both completions is that they prove the Tensleep horizon to be productive over a much larger area than the numerous upper sands, similar to conditions found in the Elk Basin field.

The completions were the Sharples Corporation 1 Good, SE NW SE 3-26n-90w, on the northwest flank, which is reported unofficially to have swabbed 200 bbl. per day at 4,733 ft., total depth, and the Sinclair-Wyoming Oil Co. 103, NE SW NE 11-26-90, on the east side, which topped the Tensleep at 5,164 ft., and was completed at 5,575 ft. for 311 bbl. The elevation on the Sinclair-Wyoming well is 6,930 ft. Sand record of the Sharples well is not yet available, but it is reported to have run approximately 500 ft. higher than in No. 103. The structure is highly faulted on the east side as shown by faults projected on the upper beds. These are the first wells completed in the field this year.

Oil has been found in 11 sands in the field, ranging from the first Wall Creek at 195 ft. to the Tensleep, below 4,000 ft. There are 9 Wall Creek sands in the Frontier formation, of which 5 are oil-bearing, the third and fourth, occurring at 400 to 600 ft., respectively, being the most important oil producers. The productive area in the Frontier sands is about 160 acres and in the Dakota and Sundance sands about 320 acres. Based on a productive area of 320 acres, the recovery of oil to the end of 1942 was 64,617 bbl. per acre, the largest of any field in the Rocky Mountain area. Approximately 800 acres, as indicated in the two wells just completed, will be productive in the Tensleep, with the limits for the horizon still undetermined. In addition to the oil, the field had produced 14.5 billion cu. ft. of gas up to 1938. The first Tensleep well was completed in the SW NW 11 in 1930 at 3,942-4,009 ft., its initial daily flow being 1,800 bbl. of 34 degrees A.P.I. gravity oil. The two new completions bring the total Tensleep producers up to 13. The U. S. Land Office at Cheyenne will offer for sale September 30 a lease on the W½ NW of 14, which is ½ to 1 mile south of production. Total production of the field to the end of 1942 was 20,617,560 bbl.

MONTANA WILDCAT COMPLETIONS

Aloe district, Toole County: Northern Ordnance, Inc., 1 Murray, C NW SE 6-32n-2w, dry and abandoned in the Ellis-Madison at 1,698 ft.

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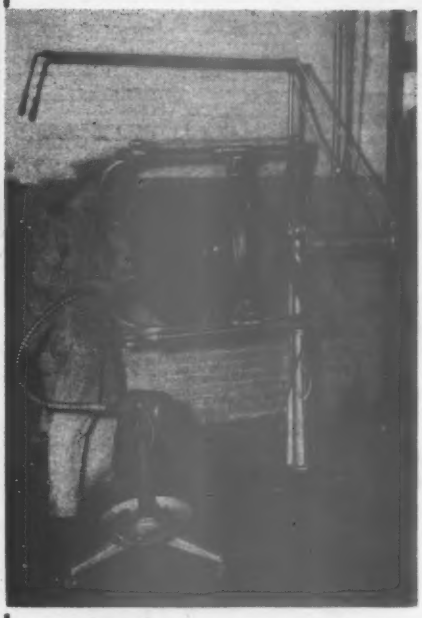

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MICHIGAN

Large Producer Completed In Newaygo County Field

SAGINAW, Mich.—Major new production from Michigan continued to be developed last week in Newaygo County's Goodwell Township as Pure Oil Co. brought in 2 Hull in Section 9 for initial potential after acid of 1,175 bbl. a day. The well was best of 8 producers reported for the week which saw 13 tests completed, including 4 dry holes, 3 of which were wildcat ventures, and 1 small gas producer.

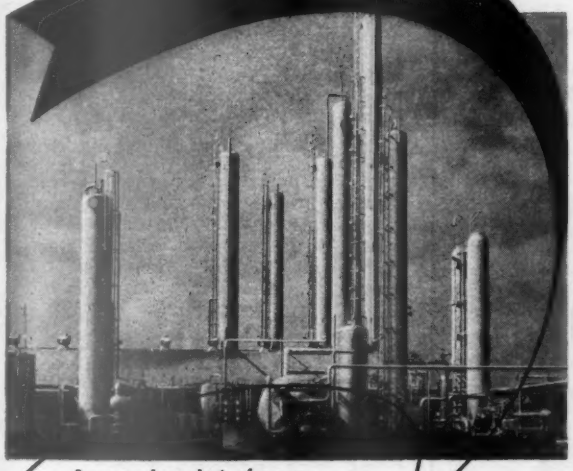
MICHIGAN WILDCAT COMPLETIONS

Antrim County, Warner Township: Oil Producers, Inc. 2 Lyle H. White, NW NE NE 17-31n-5w, dry in Monroe, T.D. 1,754½ ft.

Gladwin County, Clement Township: Charles W. Teater, 1 Fettig & Turow, C W½ SW SW 10-20n-1e, dry in Antrim, T.D. 2,430 ft.

Wexford County, Selma Township: Hassie Hunt, trustee, 1 Laslo Zayler, C W½ SW NW 30-22n-10w, dry in Monroe, T.D. 3,856 ft.

Gas for Repressuring is DRIED WITH ★ Florite



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GRAY CLAY TREATING:

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CANADIAN FIELDS

Madison Lime Topped in Canada's Deepest Test

CHATHAM, Ont.—On the Jumping Pound structure in the Alberta foothills west of Calgary, Shell Exploration-Norman 1, LSD 5, 22-24-5w5, has officially confirmed the Madison limestone at 11,588 ft. depth. This is the deepest well ever drilled in Canada, or the British Empire. If the Madison limestone here conforms with that in Turner Valley, the two main porous horizons from which the Turner Valley field gets its production should be encountered within the next 500 ft.

Location of the well, in the western part of the Jumping Pound area, is 10 miles southwest of Cochrane and about 30 miles due west of Calgary. Previous deep tests on the structure were drilled some miles farther east and north. None of them was carried deep enough to reach the Madison limestone, though shows of oil and gas were met in the upper formations.

In Shell Exploration - Norman 1 some signs of gas were encountered approaching the Madison contact. No drilling difficulties were met with.

Apart from the possibilities of deep production in the well itself, which should be determined within a few weeks, the information secured is expected to prove helpful in making further locations where the Madison will prove shallower. The Jumping Pound structure is a portion of the continuous series of folds in the foothills, east of the Rocky Mountains, of which the Turner Valley field also forms a part.

Ram River.—In the Ram River-Clearwater field, in the northern Alberta foothills west of Rocky Mountain House, Ram River Oils 2, LSD 8, 1-37-11w5, bottoming at 4,340 ft., has an indicated production of 60 to 75 bbl. daily of 40-gravity paraffin base crude under its own pressure with an estimated 100 bbl. daily on pump. Production is from a 75-ft. sand in Devonian limestone, encountered at 4,250 ft. The well shows 600 lb. closed-in pressure. The Alberta lands and mines department describes the well as indicating the establishment of a new oil field, the first in Alberta to show commercial production in the Devonian limestone. Ram River 3 will be drilled on a point higher on the structure. A 12-mile road is being constructed to facilitate transportation of the oil and bringing in materials and equipment for the new well. The field is 80 miles south and west of Red Deer and about 80 miles northwest of Turner Valley.

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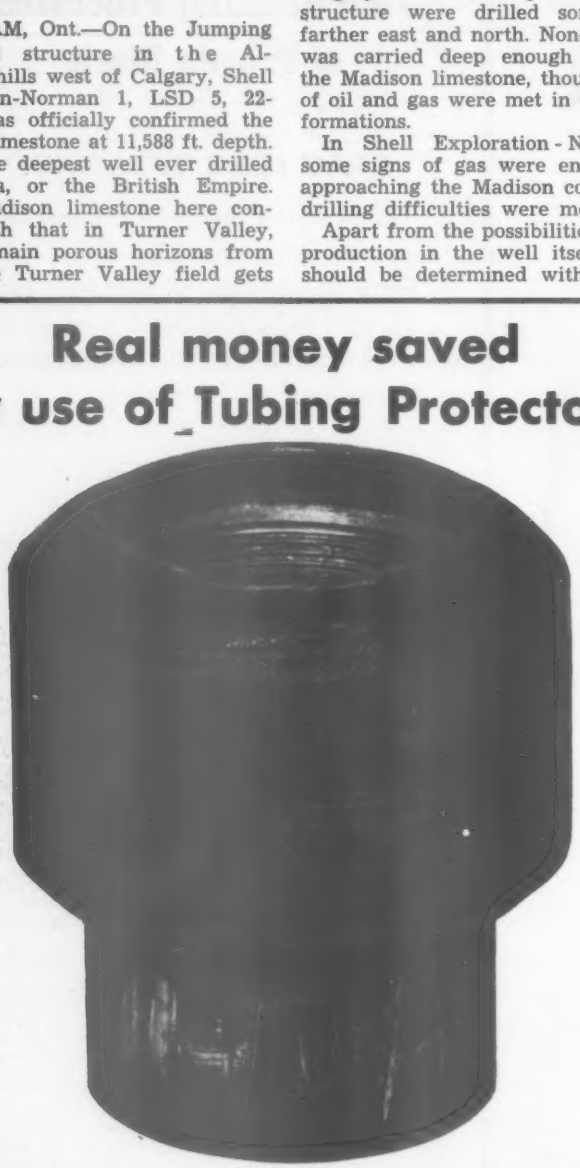

More than 1500 Patterson-Ballagh Tubing Protectors have been installed by a prominent Rodessa operating company in 65 out of 68 of their wells. The other wells will be likewise equipped when they are ready for the pump. They have as many as 100 on one string of tubing, 58 on several and some with as few as 8. Before using these Protectors they had six repair jobs where the collars had worn holes in the casing. These repair jobs cost them an average of $6000 per well to get back into good shape. Since installation of Tubing Protectors they have had no such casing trouble. They say: "These are the best Tubing Protectors. We like their plastic construction and can easily fish them out, if necessary."

"Best Bet Yet" *See Composite Catalog*

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SOUTHWEST TEXAS

Northern Hidalgo County May See Drilling Soon

CORPUS CHRISTI, Tex.—Important drilling operations are foreshadowed by Texas Co.'s acquisition of leases on 9,221 acres of land in northern Hidalgo County. The transaction, largest of its kind in months in the Rio Grande Valley, involves payment of $78,760 over a period of 10 years. The land is owned by members of the Guerra family, of McAllen, Tex.

LOWER GULF COAST WILDCAT COMPLETIONS

Bee County: W. E. Rowe 1 F. E. Moore, 6 mi. SW of Beeville, dry at 4,386 ft.

Goliad County: Humble 1 John Berger, 3 mi. NE of Fannin, dry at 5,010 ft.

Refugio County: Southern Minerals Corp. 1 J. E. Powers, 3 mi. NE of Vidauri, dry at 6,533 ft.

Victoria County: H. R. Cullen et al 1 Orbin Beall, 2½ mi. N of Decosta, dry at 6,250 ft.

SOUTH TEXAS WILDCAT COMPLETIONS

Webb County: Dulup Oil Co. 1 J. G. Garcia, 3 mi. NW of McLean field, dry at 1,913 ft.

O. W. Killam 1 J. E. Long, 2½ mi. SE of Olton, dry at 3,186 ft.

H. H. Weinert and A. B. Buschman 1 P. Leal, 6 mi. N of Bruni, dry at 2,690 ft.

Zapata County: Texas 4 B. Hartman, 18 mi. E of Zapata, dry at 2,337 ft.

SOUTH CENTRAL TEXAS WILDCAT COMPLETIONS

Guadalupe County: J. L. Sessions 2 William Maltke, 2 mi. S of Elm Creek, dry at 1,420 ft.

KANSAS

Discoveries Bring in New Fields; Reopen Another

CORALENA Oil Co. 1 Bacon-Beeching, NE NE SE 34-15-16w, discovery of the Beeching pool in Ellis County, made a high potential on completion tests, pumping and flowing 806 bbl. of oil and some 60 bbl. of water in 24 hours. Pay zone is the Lansing lime at 3,156-60 ft. Previous to plugging back to 3,200 ft. from 3,328 ft., total depth, it pumped all water.

Three other wildcats were brought in as small wells. In Rice County, Phillips Petroleum Co. 1 Volk, NE NE SW 27-18-9w, made 104 bbl. in Arbuckle lime at 3,275 ft. In Pratt County, Lion Oil Refining Co. 1 Chitwood, NE SE NW 23-28-12w, was making 25 bbl. a day in Simpson sand at 4,399 ft. and in the old Stockton pool of Rooks County, Co-op and Allan's 1 Kelly, NW NW 35-7-17w, made 84 bbl. a day in Lansing lime at 3,106 ft. The well reopens this pool.

KANSAS WILDCAT COMPLETIONS

Barton County: Continental 1-A Stoskopf, SE SE NW 22-16-13w, dry, T.D. 3,485 ft., Arbuckle 3,475 ft.

Cowley County: Derby Oil and Broswood 1 Collinson, SE SW SW 24-30-4e, dry, T. D. 2,981 ft., Mssissippi lime 2,945 ft.

Colorado Pet 1 Johnson, SW SW NE 5-35-8e, dry, T. D. 2,537 ft.

Broadview Oil 1 Brooks, S½ NE SW 29-31-7e, dry, T.D. 2,820 ft.

Ellis County: Coralena 1 Bacon-Beeching, NE NE SE 34-15-16w, pumped and flowed 806 bbl., 8 per cent water, Lansing 3,156-60 ft., T.D. 3,328 ft., P.B. 3,200 ft., pumped all water before P. B. Discovery of Beeching pool.

Gove County: Barnsdall 1 Inloes, SE NE NW 11-11-26w, dry, T.D. 4,600 ft., Mississippi lime 4,353 ft., Arbuckle 4,575 ft.

Graham County: Hollow Drilling 1 Fesler, NW NW NW 25-9-21w, pumped 35 bbl. in 2 hr., I.P. 1,904 bbl., Arbuckle 3,762-66 ft., discovery of Morel South pool.

Marion County: Veeder Supply 1 Hitt, S½ NW NW 13-19-3e, dry, T.D. 2,758 ft., chat 2,390 ft., Viola 2,736 ft.

Pratt County: Shell 1 Gereke, SE NE SW 6-26-14w, dry, T.D. 4,600 ft., Lansing 3,830 ft., Arbuckle 4,528 ft.

Reno County: Texas Co. 1 Moore, SE SW 13-25-9w, dry, T.D. 4,328 ft., Viola 4,142 ft., Arbuckle 4,295 ft.

Phillips 1 Amerine, NE NE SE 35-26-10w, dry, T.D. 4,475 ft., Simpson sand 4,374 ft., Arbuckle 4,449 ft.

Stafford County: Black-Marshall and Armer 1 Geisler, NW SE 24-22-13w, dry, T.D. 3,790 ft., Simpson sand 3,705 ft., Arbuckle 3,759 ft.

Phillips 1-A Crawford, SW SW SW 10-25-12w, dry, T.D. 4,170 ft., Simpson sand 3,969 ft., Arbuckle 4,139 ft.

NEBRASKA

ST. JOSEPH, Mo.—O. R. Newcomer was preparing to acidize 1 Lasell in the Bethany Falls limestone southeast of Tarkio, Mo. Casing was perforated with 24 shots opposite the lime which carried a showing of oil at 833 ft. Location is NW SW NW 8-64n-39w, Atchison County.

Towle et al started drilling at 1 Elizabeth M. Dillaplain, C SW NE 5-4s-15e, Brown County, Kansas, 7 miles south of Fairview.

ILLINOIS

Good Wells in Golden Gate, Mt. Carmel, Maple Grove

MATTOON, Ill.—The National Refining Co. completed one of the largest initial producers of the year in Illinois in 1 W. W. Lawrence, SE NW SE 32-2s-9e, in the Golden Gate area, Wayne County, in McClosky lime at 3,314-20 ft. The well made a natural flow of 1,000 bbl. in 9 hours and later flowed 2,000 bbl. in 24 hours through a 1¼-in. choke. It is the first very large producer in the Golden Gate pool which had only three other producing wells.

In Wabash County, Superior Oil Co. 10 E. A. Viehman, NE SW SW 9-1s-12w, in the Mount Carmel pool, produced close to 1,700 bbl. in 24 hours from Cypress sand, shot at 1,996-2,011 ft. and McClosky lime, acidized at 2,321-29 ft. Total depth 2,330 ft.

Ryan & Fortner 1 Moots, C E½ NW NE 9-1n-10e, Maple Grove field, Edwards County, was completed in McClosky lime at 3,248-56 ft., acidized. Total depth 3,259 ft. The well flowed 966 bbl. the first 24 hours.

ILLINOIS WILDCAT COMPLETIONS

Clay County: Obering & Sohio 1 Behrens, NE NE NE 25-5n-6e, dry at 2,912 ft. Upper Kincaid 1,926 ft., lower Kincaid 1,993 ft., Menard 2,125 ft., Vienna 2,238 ft., Tar Springs 2,272 ft., upper Glen Dean 2,286 ft., lower Glen Dean 2,318 ft., Golconda 2,386 ft., Barlow 2,465 ft., Cypress sand 2,505 ft., Paint Creek 2,625 ft., Benoist 2,669 ft., Benoist sand 2,680 ft., Renault 2,729 ft., Aux Vases 2,740 ft., Ste. Genevieve 2,792 ft., Rosiclare 2,823 ft., Fredonia 2,829 ft., Ste. Louis 2,898 ft.

Coles County: A. M. Myers 1 C. M. Flenner, SW NE NE 24-12n-10e, dry at 633 ft.

Jefferson County: Skelly Oil 1 R. Wilson, NE SE SW 11-2s-4e, dry at 3,112 ft., Menard 2,170 ft., Vienna 2,286 ft., upper Glen Dean 2,367 ft., lower Glen Dean 2,395 ft., Hardinsburg 2,438 ft., Golconda 2,480 ft., Barlow 2,601 ft., Cypress 2,614 ft., Paint Creek 2,755 ft., Benoist 2,794 ft., Benoist sand 2,798 ft., Renault 2,872 ft., Aux Vases 2,880 ft., Ste. Genevieve 2,906 ft., Rosiclare 2,945 ft., Fredonia 2,980 ft., McClosky 3,020 ft., St. Louis 3,106 ft.

Sohio 1 Jeff O. & G. Co., NW NW NW 16-4s-2e, dry at 2,802 ft. No tops available.

Richland County: R. B. Martin 1 C. Boyd, C S½ SE SW 26-2n-10e, 125 bbl. first 24 hours; later made as high as 325 bbl. per day, 13 per cent cut by salt water, McClosky lime 3,252-55 ft. Acid. T.D. 3,260 ft. A pool opener.

Union County: Little Egypt 1 Bosler, NE SE SE 35-11s-1w, dry at 4,053 ft., Devonian lime 2,323 ft., Maquokota 3,801 ft., Trenton 3,999 ft. Small shows of oil at 3,801 and 3,828 ft.

Wabash County: Olds Oil 1 H. Stillwell, SW SW SE 21-1n-12w, dry at 2,382 ft., Biehl 1,433 ft., Glen Dean 1,784 ft., Barlow 1,964 ft., Cypress sand 1,992 ft., Weller 2,029 ft., Renault 2,204 ft. Ste. Genevieve 2,979 ft.

Wayne County: Warren-Wright 1 Stine, CEL NE NW NW 17-1n-7e, dry at 3,243 ft. No tops available.

Robinson & Puckett 1 I. Puckett, SE SE NW 17-2s-8e, dry at 3,362 ft. Glen Dean 2,690 and 2,717 ft., Golconda 2,804 ft., Barlow 2,719 ft., Cypress 2,930 ft., Weller 2,974 ft., Paint Creek 3,106 ft., Paint Creek sand 3,134 ft., Benoist 3,168 ft., Benoist sand 3,196 ft., lower Renault 3,220 ft., Aux Vases 3,238 ft., Ste. Genevieve 3,295 ft., Fredonia 3,351 ft., McClosky 3,354-62 ft.

White County: Sam Gilpin 1 L. Kisner, SE SE NW 7-8s-9e, dry at 3,111 ft., Tar Springs 2,335 ft., Glen Dean 2,432 ft. and 2,439 ft., Hardinsburg 2,452 ft, Golconda 2,564 ft., Barlow 2,676 ft., Cypress 2,700 ft., Paint Creek 2,759 ft., Paint Creek sand 2,784 ft., Benoist 2,852 ft., Renault 2,917 ft. and 2,964 ft., Aux Vases 2,972 ft., Ste. Genevieve 3,006 ft., McClosky 3,048-51 ft. and 3,084-88 ft.

NORTH LOUISIANA

Three Wells Under Way at New Holly Ridge Pool

SHREVEPORT, La.—Two offsets to the discovery well of the Holly Ridge pool of Tensas Parish were drilling ahead last week, one of which had a show of oil and gas, and 1¾ miles to the northwest a test was reported to be starting. In view of the limited geological data on the new pool at this time, this latter well would be considered another wildcat.

An east offset to the discovery, Union Producing Co. 1 Jurden, SE SE 19-11n-10e, had a show of gas and oil in the Wilcox at around 3,000 ft. Carter Oil Co. 2 Shelly, a west offset, was drilling ahead.

ARKANSAS WILDCAT COMPLETION

Cleveland County: Lion Oil Ref. 1 Reap, SW SE NE 25-11s-9w, dry, T.D. 4,248 ft., Midway 2,637 ft., Nacatoch 3,330 ft., Saratoga 3,596 ft.

MISSISSIPPI

JACKSON, Miss.—California Co. 1 National Gasoline Co. of Louisiana, Inc., Sandy Creek plantation wildcat, 16 miles east of Natchez, in Adams County, was flowing into tanks at an estimated rate of 120 to 130 bbl. daily at the weekend.

Gulf Refining Co. was clearing location for 1 S. N. Hickman, 5-6n-20w, Lawrence County. At its 1 G. S. Stanley, 36-10n-9w, Wayne County, Gulf was drilling at 2,907 ft. in sandy shale and sand.

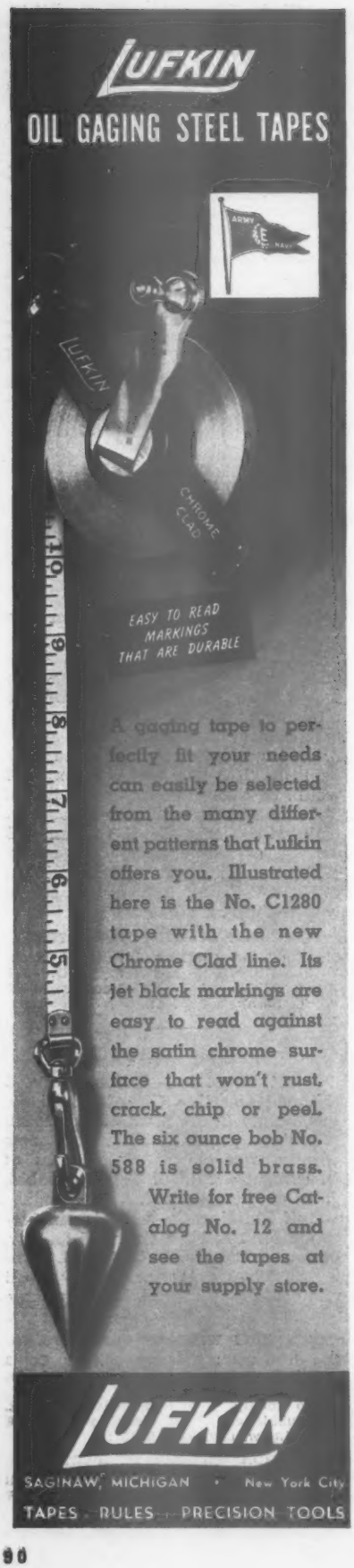
MISSISSIPPI WILDCAT COMPLETIONS

Copiah County: Freeport Sulphur Co. 1 W. B. Cliburn, NW NW NE 29-10n-9e, dry, T.D. 415 ft.

Yazoo County, W of Campbellsville: T. R. Stubblefield 1 Montgomery, SW NE 8-11n-5w, dry, T.D. 5,511 ft.

FLORIDA WILDCAT COMPLETION

Osceola County, E of Holopaw: Hunt Oil Co. 2 Consolidated Naval Stores, SW SW 15-27s-33e, dry, T.D. 2,030 ft.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OHIO, KENTUCKY

Wellington Gas Field Yields Big Wells

ZANESVILLE, Ohio.—The Wellington pool with four completions having a total open flow of 17,339,000 cu. ft. accounted for the bulk of the gas drilled last week. The pool is trending to the northeast with a thickening of the sand in that direction to 20 ft. the wells have a rock pressure of from 1,100 to 1,200 lb. and an average depth of 2,450 ft.

The Columbia Station gas pool in Lorain County was extended ½ mile to the northeast by the Ohio Fuel completion on the William Porter tract in Lot 59, Columbia Township. The well gaged 1,780,000 cu. ft. from the Clinton sand at 2,681-97 ft. with a rock pressure of 1,180 lb.

Oil drilling activity outside the Clayton pool is now centered west of Zanesville with eight drilling wells and four locations ready to go. Other locations will be made, and the area well tested.

WESTERN KENTUCKY

OWENSBORO, Ky.—The best well of the week in western Kentucky was a 440-bbl. completion in Union County, Sun Oil Co. 2 Byron Tapp, producing from acidized Levias lime at 2,495-99 ft., T.D. 2,531 ft.

WESTERN KENTUCKY WILDCAT COMPLETIONS

Henderson County: Sohio 1 Otha Royster, ½ mi. N of Robards, dry at 2,647 ft., Barlow lime 2,141 ft., Ste. Genevieve 2,401 ft., McClosky 2,603-08 ft.

Webster County: White et al 1 H. Z. Clark, near Clay, pumped 90 bbl., Palestine sand 1,227-38 ft. and 1,242-46 ft., shot, T.D. 1,248 ft. Pool opener.

LOUISIANA GULF

Rosedale Prospect Test To Be Carried Deeper

NEW ORLEANS, La.—Another attempt to find production at the 1 Iberville Mortgage Loan Co., in 74-7s-10e, 2½ miles southwest of Rosedale, in Iberville Parish, Louisiana, is to be made, this time by Sugarland Oil Co. This well was drilled originally by Humble Oil & Refining Co. to a depth of 10,025 ft. under the same farm name. Sugarland, it is announced, will carry the hole to 11,000 ft. In the same parish, Humble is clearing location for 1 Federal Land Bank, in 1-11s-13e, 4 miles southeast of White Castle. This is to be a 12,000-ft. test.

Testing operations at Danciger Oil & Refining Co. 1 Hattie Hess wildcat in the Reddell area of Evangeline Parish, continue inconclusive. This well, at total depth of 12,206 ft. in shale, plugged back to 11,812 ft., was subjected to another drill-stem test through ⅜-in. choke at the bottom and ¼-in. choke at the top, with packer at 11,756 ft. and perforations at 11,792-11,812 ft. The packer slipped after 5 minutes and the test failed. The tool was pulled, and 26 stands of fresh water and distillate and 5 stands of salt water were recovered.

LOUISIANA GULF COAST WILDCAT COMPLETIONS

Beauregard Parish: Sohio 1 Lutcher-Moore Lumber Co., 34-6s-12w, 182 bbl. distillate through ¼-in. by 6-in. choke, T.P. 2,550 lb., S.I.T.P. 2,600 lb., gas-oil ratio 19,276, perf. 8,011-20 ft., T.D. 10,911 ft., P. B. 8,076 ft. Discovery. Well shut in.

Cameron Parish: Continental et al 1 Adolph Hebert, Jr., 18-12s-8w, 140 bbl. through 8/64-in. choke, T.P. 2,650 lb., gas-oil ratio 8,254, perf. 8,571-86 ft., T.D. 13,084 ft., P.B. 8,591 ft. Discovery.

Vernon Parish: M. S. Smith 1 Nona Mills Co., 31-3n-11w, dry at 4,515 ft.

OKLAHOMA

Pauls Valley Pool Is Extended North and West

THE Pauls Valley pool of Garvin County was one of the most active and interesting spots last week. One of the field's best wells, Cities Service 1 Wimberly, SE SW NW 25-4n-1w, flowed 2,946 bbl. of oil and 4,000,000 cu. ft. of gas in 24 hours. The sand was found at 4,040-76 ft. It is another northwest extension to the pool.

A possible limit to the field on the north and east side was seen in Sinclair-Prairie Oil Co.'s 1 Patchell, SW NW 30-4n-1e. The well was running low on the sand and failed to flow after perforating with 52 shots at 4,071-84 ft. Some oil was in the hole while drilling below 4,049 ft. Southwest of the Wimberly well, Ohio Oil Co. 1 Bedal, SE NE SE in Section 26, flowed 250 bbl. of water and 230 bbl. of oil in 2½ hours at 4,092-97 ft. This well is actually a ½-mile west extension, leaving four undrilled 40 acres between it and the northwest body of the field.

OKLAHOMA WILDCAT COMPLETIONS

Lincoln County: Mid-Continent 1 Fowler, SW SW NE 33-12n-4e, pumped 115 bbl. Wilcox 5,543-48 ft., T.D. 5,562 ft., gravity 38.4.

R. H. Lynn 1 Adams, NE NE SE 8-15n-4e, dry, T.D. 3,871 ft., Prue 3,816 ft.

Logan County: Paul McIntyre et al 1 Morris, NW SW 13-19n-2w, dry, T.D. 5,468 ft., Viola 5,266 ft., Wilcox 5,368 ft., second Wilcox 5,451 ft.

Pawnee County: Flynn Oil and Geo. Deck 1 School Land, NW NE NE 16-21n-6e, dry, T.D. 3,155 ft., Wilcox 3,135 ft.

Payne County: Elson and Sohio Oil 1 McCarty, NE NE SW 7-17n-2e, dry, T.D. 4,842 ft., Wilcox 4,824 ft.

Pottamatomie County: Fain Drilling 1 Rum-Y-Tum-Moke, SW SW NE 11-10n-3e, dry, T.D. 5,749 ft., Hunton 5,345 ft., Viola 5,515 ft., Wilcox 5,635 ft.

WILDCATS AND DISCOVERIES

WILDCAT completions reported last week include 17 discoveries, making a record of 22 per cent successes. Two of these were east of the Mississippi River.

In Illinois, R. B. Martin's pool opener in Richland County, made a fair McClosky well but was also cutting salt water. It is about 3 miles northeast of Maplegrove and the same distance west of Parkersburg. In Webster County, Kentucky, the Palestine sand of upper Chester age was found productive in a well near Clay. The discovery well was a fair pumper and, since the Palestine is not a prolific pay, the area opened will probably not be large.

Kansas has two new spots opened by pumpers, of which Coralena Oil Co.'s find in southern Ellis County may open up a fairly large area. Nearest production is Winget, 5 miles to the south in Rush County and a little farther to the northeast in Russell County are the Foster and Steinert pools. None of these pools are of much consequence but the new discovery, known as the Beeching pool, may show better results. In Graham County, Hollow Drilling Co. has found Arbuckle production about 2 miles southeast of the Morel pool and the two areas will probably be connected eventually.

Oklahoma's discovery is a pumper near Meeker on the south edge of Lincoln County. Other pools have been opened in this area recently but none have proved extensive.

Limestone pays keep in the spotlight in North Texas with new pools in the Marble Falls, Mississippi and Ellenburger. Of these the first two were in Young County, both in thickly drilled areas. The Ellenburger find was in Wilbarger County. In the Permian basin, the Clear Fork was found productive in the Keystone area and the more or less dormant Hill area, also in Winkler County, was extended. The Delaware sand provided a small pumper in Eddy County, New Mexico, south of the Getty pool.

On the Gulf Coast, there were only two discoveries, both in southwestern Louisiana. One was a distillate well in Beauregard Parish, about 6 miles southeast of the Bancroft field. Pay is probably Cockfield, which produces in a few fields along the Wilcox trend. The Wilcox was found dry in this well. The other coastal discovery was at Big Lake in Cameron Parish where Continental's 13,084-ft. test was plugged back to 8,591 ft. to make a producer.

California has had a good week with two gas and two oil discoveries completed. The new gas fields are in Madera and Sacramento counties and are the seventh and eighth gas discoveries of the year. Continental's pool opener in the McClung area, 3 miles southeast of the Greeley field and the Bandini Petroleum Co.'s find west of Round Mountain are thought by some to be edge wells. These may both be pool openers of considerable importance.

WILDCAT COMPLETIONS

	Week ending September 25, 1943					Cumulative total for 1943				
	Oil	Distillate	Gas	Dry	Total	Oil	Distillate	Gas	Dry	Total
Ohio	0	0	0	0	0	4	0	19	34	57
Indiana	0	0	0	0	0	2	0	0	48	50
Kentucky	1	0	0	0	1	17	0	2	91	110
Illinois	1	0	0	9	10	49	0	2	310	361
Michigan	0	0	0	3	3	9	0	1	102	112
Kansas	2	0	0	11	13	50	0	0	265	315
Nebraska-Missouri-Iowa	0	0	0	2	2	0	0	0	17	17
Oklahoma	1	0	0	5	6	36	1	13	195	245
Texas:										
North Central	3	0	0	7	10	43	0	1	269	313
West	2	0	0	0	2	9	0	1	63	73
Panhandle	0	0	0	0	0	0	0	0	0	5
East	0	0	0	4	4	4	0	1	82	87
Gulf Coast	0	0	0	1	1	4	7	6	81	98
Southwest	0	0	0	8	8	18	11	2	206	237
Total	5	0	0	20	25	78	18	11	706	813
Louisiana:										
North	0	0	0	0	0	4	0	3	52	59
Gulf Coast	1	1	0	1	3	12	6	1	23	42
Total	1	1	0	1	3	16	6	4	75	101
Arkansas	0	0	0	1	1	2	0	0	50	52
Mississippi and Southeast	0	0	0	3	3	3	0	0	43	46
Montana	0	0	0	1	1	2	0	0	14	16
Wyoming	0	0	0	0	0	6	0	0	13	19
Colorado, Utah	0	0	0	0	0	0	0	1	2	3
New Mexico	1	0	0	0	1	5	0	2	19	26
California	2	0	2	3	7	5	0	8	104	118
Total United States	14	1	2	59	76	284	25	63	2,088	2,460
Total previous week	3	0	1	48	52					

CALIFORNIA

New Pool Opened West Of Round Mountain

LOS ANGELES, Calif.—Bandini Petroleum Co. proved existence of a new oil pool west of the Round Mountain field in Kern County and Texas Co. finished its gas well in the Firebaugh district about 10 miles northwest of the Mendota gas field in Madera County. The gas well was killed after being given a production test last week and has been returned to production flowing 6,500,000 cu. ft. of gas daily from 3,920-35 ft.

Bandini's discovery well currently is producing 135 bbl. of 14.5-gravity oil, cutting 3 per cent emulsion, 0.2 per cent sand and 0.6 per cent water. This well is a Vedder zone completion and gives Bandini several potential locations. General Petroleum Corp., however, will probably benefit to the greatest extent as it has much of the surrounding acreage.

The productive Vedder in the Bandini well is at 2,420-35 ft., a normal thickness of this Miocene zone for the area. Bandini's new well appears to be an edge well and is probably quite far down the structure.

Acreage in this area is held in large blocks.

Fresno County.—Shell Oil Co., Inc., should reach the top of the pay in the West Raisin City field within the next few days if its 1-1 San Joaquin is to show commercial production. Shell's well was drilling ahead late in the week at 6,250 ft. and coring for top of the section. This project is located northwest of the joint completion of Seaboard Oil Corp., Tide Water Associated Oil Co. and Union

(Continued on page 98)

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Among the Drilling Contractors

Morris-Hamilton Drilling Co., Houston, Tex., was drilling plug from surface pipe set at 800 ft. at Phillips Petroleum Co. 1 Cooley, in the Bear field, Beauregard Parish, Louisiana. It is at work on two wells, 13 and 14 Gray, in the Ged field, Calcasieu Parish, for Union Oil Co. of California.

Union Rotary and Drilling Co. is the rotary-drilling contractor on the Turner Petroleum Corp. 1 Farmer Hildenbrandt (Comm.), C N½ NW NE 34-18n-3w, Clare County, Michigan. The company will also drill on its own account the 1 Howard E. Ruhl, in C NW NE 6-18n-9w, Osceola County, Michigan.

Nicklos Drilling Co., Houston, Tex., will drill 1 Stewart-Perkins, in the Pine Prairie field, Evangeline Parish, Louisiana, for Texas Co. It will do a workover job for the same company at Unit 38-1, in the Erath field, Vermilion Parish. The contractor was ready to spud 1 Somerset Land & Cattle Co., a projected 10,500-ft. test 11 miles southwest of George West, in Live Oak County, Texas, for Continental Oil Co. Nicklos was drilling at 9,635 ft. at Pan American Production Co. 3 Crowell Land Mineral Co., projected to go 11,000 ft., on the west side of the Pine Prairie dome, in Evangeline Parish. It was at 9,100 ft. at 2 Acadia Parish School Land, for Continental.

T. L. Wheeler, Wichita Falls, Tex., is drilling Humble Oil & Refining 1 C. M. Berry, Woods Survey, southeast Haskell County, Texas, which is to be a Palo Pinto lime test. He is also drilling a well in the North Avoca pool, Jones County, for Daniel Producing Co.

Van S. Welch, Artesia, N. M., has contract to drill S. J. Iverson 1 Iverson, a wildcat test in the NW NW 30-18s-33e, Lea County, New Mexico, 6 miles south of Maljamar pool and 4 miles southwest of Corbin pool.

Falcon-Seaboard Drilling Co., Houston, Tex., was rigging up late last week at 1 Richardson, a wildcat test for Sun Oil Co. near Buna, in Jasper County, Texas. It was moving in at 1 Johnson, to be drilled for Shell Oil Co., Inc., near Odessa, in Ector County, West Texas. The rig was moved from West Virginia. It was at 10,000 ft. at 1 Trimble, which it is drilling for Sun in the Egan field. Acadia Parish, Louisiana. Falcon-Seaboard was at 4,000 ft. at 1 Jackson estate, a projected 10,600-ft. test which it is drilling for its own account and for William Helis, in the East Gibson field, Terrebonne Parish.

Alberta Drilling & Development Co., Calgary, Canada, has contracted to drill Trans-Alberta Oil's test in

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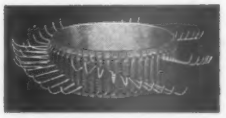

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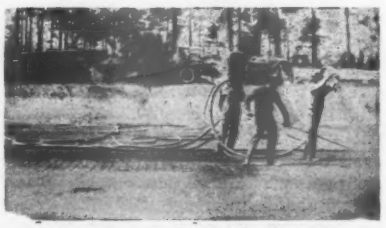

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Phones: Wydown 9-3539 Woodcrest 6-4387

the Twin River area, southern Alberta. The contractor is moving rotary rig from the Turner Valley field.

Patrick-Tyrrell Drilling Co., Houston, Tex., has received contracts from Gulf Refining Co. for two wells in Mississippi. In Jefferson County it will drill 1 Cato, a wildcat, near Union Church. In Wayne County it is below 1,175 ft. at 1 Stanley, semi-wildcat about 3 miles from the 1 Aden Davis, a small producer recently completed for Gulf at total depth of 7,100 ft.

Fred H. Kiel, Wichita Falls, Tex., has contracted to deepen 16 wells in the Wimberly pool of Jones County and the Reddin pool in Taylor County, Texas, preparatory to dual completions from the lower Hope and Gunsight producing formations. The wells will be deepened from approximately 2,200 ft. to 2,550 ft.

Likens & Hall, Midland, Tex., have been given drilling contract on the Ralph Lowe 1 fee, in C SE Section 21, Block A-26, Public School Land Survey, Andrews County, Texas, a 7,500-ft. test to the Fullerton Permian pay section.

Brewer Drilling Co., Artesia, N. M., will drill Emperor Oil Co. 7-B Puckett, NW NE 25-17s-32e, Eddy County, New Mexico, on the west side of the Maljamar pool.

S. B. Roberts, Abilene, Tex., has moved in on Globe Oil & Refining Co. 1 T. R. Henderson, 1 mile northeast of the Page pool of Schleicher County, Texas.

Harry L. Edwards Drilling Co., Houston, Tex., set surface pipe and was drilling plug at Stewart 3 Brandes, in the North La Ward field, Jackson County, Texas. It recently completed 2 Brandes, in the same field, for Stewart. Edwards was drilling below 9,000 ft. at 2 Peters, a 10,500-ft. test for Pan American Production Co. in the South Gillock area of Galveston County.

Contractors to Hear Problems Discussed

HOUSTON, Tex.—A program dealing with acute problems in the drilling phase of the oil industry has been arranged for the third annual meeting of the American Oilwell Drilling Contractors Association in Houston, Tex., October 5 and 6.

The first day will be devoted to registration, meeting of committees, the president's address, committee reports, directors' meeting, and an address by J. E. Warren, of Midland, Tex., on "Need for Continuity of Operations." At the banquet, John R. Suman, vice president, Humble Oil & Refining Co., Houston, Tex., will preside as toastmaster, and Gov. Coke Stevenson, of Texas, will be the speaker.

Four addresses are tentatively scheduled for the morning of the second day, these being: "Fitting Drilling Equipment and Practices to Present Conditions," by Lyle Cashion, Houston; "The Need of the Drilling Contractor in the Oil Industry," by Chase Sutton, Houston; "Past Achievements and Future Aims of the Association," by A. H. Rowan, Fort Worth, Tex.; and "The Need for Sound Accounting Practices," by W. K. Powell, Dallas, Tex.

New officers will be installed at the luncheon meeting, and the afternoon will be given over to a symposium, with addresses and remarks by representatives of various governmental agencies. These include D. R. Knowlton, director of production; Frank A. Watts, director of materials; Dr. F. H. Harbison and George E. Dewey, labor counselors, and Glenn A. Campbell, chief of the priorities unit, PAW, Washington; C. E. Naylor, director of materials, PAW District 3, Houston; Maj. John D. Copeland, Jr., manpower division, state Selective Service Bureau, Austin, Tex. Also scheduled for remarks is a representative of the War Manpower Commission.

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"I've seen enough leakage through worn threaded connections to pay for the line. But I haven't seen any such leaks since we first tried RECTORSEAL. Now it's my job to see that RECTORSEAL goes on all threaded connections around the rig . . . and I don't get any kick-backs. Besides preventing leaks, it helps us make up and break out lines faster."
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RECTORSEAL
PIPE THREAD LEAK PREVENTER

NEW
Cement Retaining
BASKET

Patents 2,258,052 2,220,237

New WEATHERFORD basket has leaves pre-formed (except at ends) like concave blade of a fine steel tape. Long spring leaves anchored to top and bottom collars. Half-length spring leaves anchored to bottom collar only. Bottom collar welds to casing. Top collar has slots which permit limited up-and-down movement on lugs welded to casing. Impossible for tool to telescope. Pre-formed leaves overlap snugly to form sludge-tight retainer when expanded against walls of hole. The final, perfect answer to cement-retainer problem. Makes an exact science of stage cementing. Send for one or more prepaid, on approval. No obligation. Return collect if not wanted. Illustrated folder now ready—write for it.

LEAF SPRINGS furnished oil country shops for fishing tools, packers, etc.

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Weatherford, Texas, U.S.A.
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Handle Wire Rope Reels Without A Struggle!

Simplex No. 322 Cable Reel Jack. Capacity: 10-tons; lift, 13¾"; height, 29". For reels 36" to 84" in diameter

With a pair of Simplex Reel Jacks, wire rope can be paid out with greater speed, safety and economy. Made with right and left hand bases for even jacking. Also made in screw jack types.

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Chicago (44), Ill., Dallas, Texas
Better, Safer Oil Field Jacks Since 1899

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LEVER - SCREW - HYDRAULIC
Jacks

PERSONALS

C. C. RORIPAUGH

Shell's West Texas Manager Came Up The Hard Way

C. C. RORIPAUGH, recently promoted from superintendent to manager of Shell Oil Co., Inc.'s West Texas-New Mexico division, learned the oil business from the bottom up after digging his way through several hard-rock mining jobs. He was born in Auld, Calif., and went to grade and high school in Riverside and Fallbrook, Calif.

He finished high school in 1918 when he was 18 years old and so he grabbed his diploma in one hand and a musket in the other and took off for France with the U. S. Army. He was 1 year in France and 2 years in the Army after which he entered the University of California. He interrupted his studies for 1 year to do mining and engineering work and after receiving his bachelor degree in mining engineering in 1925 continued in copper mining for a couple of years.

He decided that the oil business had a brighter future than copper mining and in 1927 he joined the Shell Oil Co. He worked as well puller, rotary roughneck and junior engineer before being given the job of division engineer in the Ventura, Long Beach and Los Angeles areas.

He became division mechanical engineer for the West Texas division of Shell in 1937 and in 1939 was promoted to division superintendent.

Charlie married in 1925 and has two sons, ages 13 and 16, who are presently making him learn airplane engineering along with them.

A. W. Green, assistant manager of the tax department for Cities Service Oil Co., Bartlesville, Okla., has been promoted to head of the division, succeeding **Fred Collins,** who resigned September 30 and will establish residence in California.

Harry Kniseley, Jr., joined the public relations department of Carter Oil Co., Tulsa, October 1, as editor of "The Link," monthly house organ, replacing **Willard Bassman,** who leaves soon for active service in the armed forces.

Paul J. Bond, on leave from Pure Oil Co., last week was appointed PAW District 2 director of transportation. He has been acting director for the past 6 months after previous service in the Transportation Division at Washington, D. C.

D. L. Riley, vice president and technical adviser of Hughes Tool Co., Houston, Tex., discussed "Postwar Planning and Its Relation to Improvements in Production Methods" at the fall meeting last week of the Houston chapter of the American Society of Tool Engineers, held at the Houston Country Club. Mr. Riley is credited with building the first piece of high-production equipment for use in the manufacture of aircraft engines.

Capt. Ralph E. Creager, post adjutant at Foster Field, Victoria, Tex., recently received his promotion from first lieutenant. Captain Creager was employed as a special clerk in the production department of Gulf Oil Corp., Houston, Tex., when he entered military service.

Joseph P. Gudger, traffic manager of the Gulf companies, Houston, Tex., presided at the fall quarterly meeting of the Southwest Shippers' Advisory Board in Fort Worth, Tex., Wednesday and Thursday of last week. Mr. Gudger is general chairman of the board, which is composed of representatives of industries in Oklahoma Texas, Louisiana, Arkansas and New Mexico.

Bert Johnson, member of a drilling crew for Texas Co. in various Texas fields before he enlisted for war service, is in a hospital in North Africa, recovering from injuries suffered when he was thrown out of a jeep, according to word received by Mrs. Johnson, who is employed by Humble Oil & Refining Co. in Houston, Tex. Mr. Johnson has been serving as tail gunner in a bomber. His injuries were not believed to be critical.

Dudley E. Cornell, director of the marketing division in District 3 of the PAW since September 1942, has been made district counsel. He is succeeded by **Edmund J. Dorgan,** who served under Mr. Cornell as chief of the facilities section. The offices of both men will continue to be in Houston, Tex. In June 1942, Mr. Cornell was appointed state enforcement attorney for the OPA in New Mexico, leaving that post to become director of marketing. Mr. Dorgan was in Pan American Production Co.'s marketing division 16 years before joining the PAW.

H. E. Ammerman, formerly assistant to **E. L. Sauer,** vice president of Republic Oil Refining Co., Houston, Tex., has been made superintendent of Duval Pipe Line Co. and Republic Pipe Line Co., Benedum-Trees affilates, with headquarters in Corpus Christi, Tex. He takes the place of **G. E. Casey,** who recently retired. **J. E. Kelley,** formerly vice president of Southport Petroleum Co., American Liberty Oil Co. and American Liberty Pipe Line Co., subsidiaries of Murchison & Wynne, Dallas, succeeds Mr. Ammerman as assistant to Mr. Sauer.

Lt. Col. Homer G. Olmsted, camp engineer at Camp Hood, Killeen, Tex., retired to inactive status September 30. He plans to resume his practice as consulting engineer in Houston, Tex. Before his assignment to Camp Hood, Colonel Olmsted supervised all construction work at Ellington Field, Houston.

W. E. Ulrey, formerly with National Tank Co., Corpus Christi, is now superintendent of the Anco Gas Corp. recycling plant at Long Lake, and is living at Palestine, Tex.

George F. Smith, former vice president of the Continental Oil Co., has been elected a member of the board of the First Industrial Bank of Denver.

W. M. V. Ash, who has been in charge of Shell Exploration Co. work

in Alberta for some time, with headquarters at Calgary, will leave shortly to take a position with the Shell at New York. He will be succeeded at Calgary by **W. C. Chonette**, formerly petroleum engineer for the company at Los Angeles, Calif.

Dr. Ben H. Parker, of the Colorado School of Mines, was elected vice president in charge of geology and land work of the Frontier Refining Co. at the annual meeting at Cheyenne, Wyo. It is a newly-created office. **T. E. McClintock**, president of the Denver Joint Stock Land Bank, was named a director to succeed **Hal Writer**. Officers reelected were **M. H. Robineau**, president; **H. E. Armitage**, vice president and treasurer; **W. R. Newman**, vice president in charge of manufacturing; **D. B. Thompson**, secretary, and **A. L. Hallam**, assistant secretary.

E. L. Chapman, Enid, Okla., has been transferred to the Billings, Mont., office of the Gulf Oil Corp. to succeed **Gay Dorough**, who has entered the military service.

Charles S. Jones, president of Richfield Oil Corp. and **Norman McKee**, vice president of Southern Counties Gas Co., have been appointed and accepted positions as division heads of the Los Angeles Community Chest.

Rudolph Miller for some time past tax agent of Standard Oil Co. of California, with offices in San Francisco has been elected assistant treasurer of the company and will be in charge of property taxes and insurance for the company and affiliates.

Burton Hufford was elected chairman of the Taft chapter of the California Natural Gasoline Association at a meeting held in the Standard 10 Club House, Taft, Calif., September 23.

William Hurst, Dallas, Tex., has resigned his position with Core Laboratories, Inc., to accept position in the production research department of Shell Oil Co., Inc., Houston, Tex. Mr. Hurst was formerly in production research for Humble Oil & Refining Co. for a number of years.

James Fitz-Gerald, Jr., for the past 6 years division manager of the land and lease department for Skelly Oil Co., at Midland, Tex., has resigned to enter the oil business as an independent operator, with emphasis on wildcatting. Mr. Fitz-Gerald has been with Skelly for 17 years, and in the geological department for 11 years, the last 4 of which he was district geologist at Midland. Prior to that he was in the geological department of Empire Gas & Fuel Co. **H. Winston Hull**, of the Tulsa office of Skelly Oil Co., will replace Mr. Fitz-Gerald at Midland, and **H. H. Kaderli** will be land man of the West Texas and New Mexico division. **Dr. W. F. Bailey** will continue as division geologist.

Edward H. Kares, project coordinator in the general engineering department of the Standard Oil Development Co., Bayway, N. J., has been appointed director of construction for PAW District 1. He is assigned to helping individual oil companies expedite completion of war construction work, particularly aviation-gasoline plants at refineries. He was in charge of coordinating the engineering and construction work on a large 100-octane unit at Baton Rouge, for Standard Oil Co. of Louisiana.

Henry Linam, formerly president of the Standard Oil Co. of Venezuela, and **Homer McDuff**, previously drilling superintendent for that company in eastern Venezuela, have joined Rubber Reserve Corp. Mr. McDuff has been assigned to special work in Brazil and Mr. Linam has become an executive vice president of the RRC, a subsidiary of the Reconstruction Finance Corp.

Kenneth C. Vaughan was recently appointed production foreman of the Dominguez district for Union Oil Co. of California.

George J. Stoll, eldest son of Charles C. Stoll who died September 5, has become president of the Stoll Oil & Refining Co., Louisville, Ky.

Shifts: **J. C. Bruce**, superintendent, British-American Oil Producing Corp., Tulsa, to Seymour, Tex.; **Willard M. Dow**, engineer, East Ohio Gas Co., Seattle, Wash., to Denver, Colo.; **H. E. Stommel**, engineer, Magnolia Petroleum Co., Fort Stockton, Tex., to Winnfield, La.; **Harry X. Bay**, geologist, Texas Co., Houston, Tex., to New Orleans, La.; **H. I. Crowe**, superintendent, Gulf Oil Corp., Bloomington to Victoria, Tex.; **R. N. Bills**, geologist, Amerada Petroleum Corp., Thibodeaux to Gonzales, La.; **Wayne A. Wilson**, engineer, Phillips Petroleum Co., Bartlesville to Duncan, Okla.

Albert J. Jones, formerly with Humble Oil & Refining Co., and Wilshire and Miley Oil Co., is now supervising engineer for Reconstruction Finance Co., at Los Angeles, Calif. Mr. Jones was with Humble in Arkansas, and was geologist for Wilshire and Miley.

Earl Corkrum, former member of the Illinois State Geological Survey, has joined the geological staff of Carter Oil Co., and will be stationed at Mattoon, Ill.

Donald L. Norling, geologist for Shell Oil Co., Inc., has been transferred from Tulsa to Centralia, Ill.

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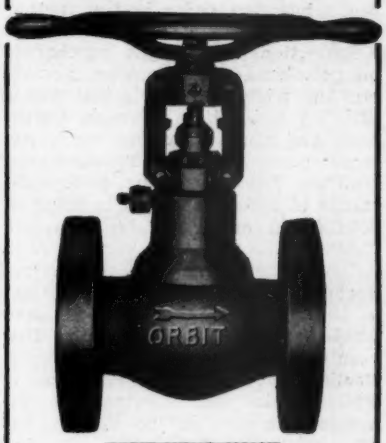
More than ever before you need valves that can "take it."

ORBIT VALVES



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ORBIT WING VALVE

This valve is especially designed for Wing Service. Made in 2" size only in both flanged and screwed ends. Opening through valve is 1⅛". Seats of cast Stellite J Metal.

YOUR ORBIT VALVES

will last for the duration. Meanwhile, if you have any questions regarding their care or maintenance, write us.

OIL WELL IMPROVEMENTS CO.

Since 1912

TULSA, OKLAHOMA

Market Developments

East Coast

NEW YORK.—Several developments during the past week further reflected the continuing improvement in the District 1 oil-supply situation. These developments included a reduction in tanker rates, increased refining in the district, suspension of the conversion order and a further gain in the index of available supply.

Reductions in freight surcharges on petroleum products were numerous and widespread. Principal routes affected were those between Caribbean and Gulf ports and north Atlantic ports, including Portland and Halifax. The reductions gave substance to reports of plans to bring in 400,000 bbl. of oil per day from the Caribbean.

District 1 refinery runs were reported up to 740,000 bbl. daily, against a 1943 first-half average of some 530,000 to 550,000 bbl. daily. This resulted principally from the inauguration of big-inch deliveries to Philadelphia and substantially increased supplies in the district. Intradistrict distribution is now the major problem.

The order requiring conversion of units consuming more than 12,000 gal. of residual fuel oil per year has been suspended in light of the present coal shortage.

Mid-Continent

BUYING pressure continued this week on Mid-Continent refiners for all products, except residual-fuel stocks. Even in the heavier fuels a slight improvement was reported because of winter heating requirements added to the regular power loads of railroads and industry.

Refiners continued to reject buying orders on motor fuel because of their inability to satisfy all inquiries. Light furnace oils are in stronger demand. Most distributors in the northern states are working off storage of light fuels as consumers inaugurate continuous furnace operation. Calls for gasoline are particularly brisk from the agricultural districts where harvesting, fall planting and other increased use of mechanized equipment is stimulating consumption. Furthermore, regulatory bureaus are concentrating currently on diversion of sufficient gasoline to meet all requirements of farmers.

Numerous refiners this week were reported converting dirty tank cars to clean-oil service in order to uncork certain bottlenecks in the distribution system. Demand for clean oils, gasoline, kerosene, and light distillate fuels is growing out of proportion to the call for residual, precipitating an unbalanced relationship between transportation facilities.

Natural-gasoline demand remains higher than available supplies. Sellers are, in some instances, asking premiums above current quotations and report that there is little resistance to higher prices. Refiners are willing to pay from an eighth to a quarter cent above the market to attract supplies. Manufacturers, however, are unable to accept new spot business and are attempting to spread the limited supplies over the entire market.

Gulf Coast

HOUSTON, Tex.—A little easier tone was observable in the residual-fuel oils this week, marking the only material change from the extreme tightness that has prevailed in the Gulf Coast refinery market for months. Natural gasoline was referred to as increasingly hard to find.

PAW Directive 59, which requires secondary suppliers in the East to make their purchases of oil products from primary suppliers in their own zones, is being enforced with fresh emphasis, according to refiners and marketers in this territory. Some secondary suppliers, in their efforts to meet problems growing out of scarcity, are understood to have been dealing direct with suppliers in other districts. The directive, which apparently had been applied with leniency, is now operating effectually to halt this practice. The stricter policy affects the volume of business done by these secondary suppliers and also that of marketers with whom they dealt. So far as refiners are concerned, however, the volume of their business is not touched.

It afforded no occasion for hat tossing, but refiners reported this week that some of the shortages in oil products seemed to have reached their limits, with inventories beginning to make modest turns upward. Stocks of all products in tanks of the 11 operating refineries in the Gulf Coast Refiners Association totaled 3,644,000 bbl. on September 15, a rise of 323,000 bbl. for the half-month. Stocks of all gasolines were 1,830,000 bbl., compared with 1,807,000 at the end of August. Bunker C fuel oil totaled 293,000 bbl., up 60,000 bbl. from the August 31 mark.

Pacific Coast

LOS ANGELES, Calif.—Very little trading was done in California during the past week with the result that prices remained unchanged on all products. The recent announcement of OPA that gasoline rationing coupons would probably be reduced from 4 gal. per week to 3 gal. weekly is causing marketers to make new estimates for the remainder of the year.

With the prospect of reduced sales in the offing, however, it is thought marketers will make more than an ordinary effort to induce resellers to take premium grades of gasoline and not the competitive grades. Decreased volume of sales will probably force resellers to take on Ethyl grades which yield the reseller a larger margin of profit. What effect this proposed reduction will have on the number of service stations resuming business remains to be seen but it would appear quite probable that it would arrest the upswing in the resumption of business in stations that have been closed down since early in 1942.

Crude oil, natural gasoline, gas oil and kerosene distillates continue to be tight with very little offered. Some refiners have made contracts with independent plant operators to take all production of gas oil and kerosene distillate produced. This has had the effect of reducing the amount that would normally be sold in the spot market.

A.P.I. REFINERY REPORT

(Figures in thousands of barrels)

Week Ended September 18, 1943

	Dly. crude runs to stills	Stocks: Gasoline	Stocks: Residual	Stocks: Gas oil
Appalachian	160	2,194	486	867
Ind., Ill., Ky.	771	13,935	3,416	5,898
Okla., Kan., Mo.	339	6,092	1,619	2,255
Censored area*	2,094	30,756	17,506	18,576
Rockies	120	1,260	760	427
California	725	17,022	43,106	12,276
Total 9-18-43	4,209	71,299	66,893	40,299
Total 9-11-43	4,216	71,928	67,011	39,401
Total 9-19-42	3,740	79,077	79,722	45,133

*Reports combined on East Coast, Texas Gulf, Louisiana-Arkansas and Inland Texas at request of PAW.

CRUDE-OIL STOCKS

(Bureau of Mines Estimate)

Week ended:	Bbl. of crude*
September 18, 1943	233,681,000
September 11, 1943	234,389,000
September 19, 1942	244,294,000

*Excludes unrefinable California stocks.

Refinery Prices

(Prices as of September 28, 1943)

Quotations are f.o.b. plant in cars and in cents per gallon except where otherwise noted. They are exclusive of the federal excise taxes of 1.5 cents a gallon on gasoline and 4.5 cents a gallon on lubricating oils, and do not include marine lighterage charges.

REFINERY GASOLINE

Octane (A.S.T.M.):	†80	74-76	70-72	68-70	63-66
Mid-Continent*			6.000		5.625
Pennsylvania		6.750-7.000			
Gulf Coast	6.00-6.50		§5.750-6.250	§5.750-6.250	§5.250-5.750
Northeast Coast	9.80		9.2	9.2	
California	6.750-7.500	6.250-6.500	6.125-6.250	5.750-6.125	5.125-5.500

*Basis Group 3. †1939 C.F.R. (research method). §Unleaded.

KEROSENE AND NO. 1 FUEL OIL

Gravity:	46	45	42-44	41-43	38-40
Mid-Continent*			4.500	4.375	
North Louisiana				4.500-4.750	
Pennsylvania	6.250-6.625	6.125-6.250			
California				4.500-5.500	4.250
Northeast Coast				6.80	
Gulf Coast				4.125	

*Basis Oklahoma Group 3.

TRACTOR, DIESEL, AND BUNKER FUEL OIL

Specifications:	46-48° G.	24 D.I.	48-52 D.I.	58 & above	Diesel bunkers	Residual Bunker C†
Mid-Continent*	4.125					$0.80-1.27
California		2.750-4.000			†1.35-1.45	0.85-1.00
Gulf Coast			4.000	4.125	1.45	0.85-1.27
Northeast Coast				6.800	2.780	1.65-2.07
North Louisiana						0.80-1.27

*Basis Oklahoma Group 3. †Gravity range. ‡Pacific Specification 300.

FURNACE OIL, GAS OIL, FUEL OIL

	No. 2	No. 3	No. 5	No. 6
Mid-Continent*	3.625	3.500	$0.95	$0.80
Pennsylvania (West)	5.875-6.125	5.875-6.000	†5.250-5.500	
Northeast Coast	6.7	6.7	1.95	1.65
California	5.5	5.5	‡1.10-1.35	§1.10-1.15
Gulf Coast	3.750-3.875		1.35	0.85

*Basis Oklahoma Group 3. †36-40 gravity fuel. ‡Pacific Specification 300. §Pacific Specification 400.

NATURAL GASOLINE

Grades:	26-70	18-55
Oklahoma (Group 3)	4.375	5.125
North Texas	4.000	4.125
North Louisiana	4.125	4.250
California	4.875	5.500

LUBRICATING OILS

Bright and Steam Refined

OKLAHOMA (Group 3)—

200-210 D. 10-25		27.00
150-160 D, 0-10		23.00
120-125 D, 0-10		22.00
Steam refined:		
800 dark green (untreated)		9.00

PENNSYLVANIA—

Bright Stocks (Pennsylvania Grade No. 8 color, 140-150 at 210, 545-550 flash)

10 pour point		30.50
15 pour point		29.50
25 pour point	25.00	28.00
Steam refined:		
600	15.00	16.00
650	15.50	16.50
660 flash	16.00	17.50
630 flash	17.00	17.50

Neutral Oils

Vis. at 100° F. except Pennsylvania and color N.G.A.)

OKLAHOMA (Group 3)—

0-10 pour point:

300-3	15.00
400-3	18.00
500-3	19.50
600-3	20.00

Note: Viscous neutrals, 10-25 pour, quoted 0.5 cent under 0-10 oils.

CALIFORNIA—

300-2½-3	7.00	7.75
400-3-4	7.25	8.00
600-3-4	8.75	11.00

Neutral Oils

Red oils:

200-4-5	7.00	7.75
400-5-6	9.00	11.00
500-900, 5-6½	9.25	11.25

GULF COAST—

Pale oils:

200-3	8.50	8.75
300-3	9.00	9.25
500-3½	9.75	10.00
750-3½	10.00	10.25
2,000-4	10.50	10.75
3,000-4	12.25	12.50

PENNSYLVANIA—

150 vis. at 70° F., 3 color, 400-405 flash:

Zero pour point	37.50
10 pour point	36.50
15 pour point	35.50
25 pour point	30.00

200 vis. at 70° F., 3 color:

Zero pour point	39.50
10 pour point	38.50
15 pour point	37.50
25 pour point	32.00

WAX

(Cents per pound)

OKLAHOMA (Group 3)—

124-126 (A.m.p.) w.c. scale	4.250

PENNSYLVANIA (inland refineries)—

122-124 (A.m.p.) w.c. scale	4.250
124-126 (A.m.p.) w.c. scale	4.250

NEW YORK—

Wax in bags fully refined:

130-132 (A.m.p.) wax	5.850
133-135 (A.m.p.) wax	6.150

Crude scale:

124-126 (A.m.p.) w.s.	4.250
124-126 (A.m.p.) y.s.	4.250

TANK-WAGON PRICES IN 50 CITIES

(Gasoline prices based on regular grades, tax included, undivided dealer)

ATLANTIC AND NEW ENGLAND

(Socony-Vacuum Oil Co., Inc., and Atlantic Refining Co.)

	Dealer tank wagon	Combined tax	Kero tank wag.
Baltimore, Md.	15.95	5.50	10.50
Boston, Mass.	14.90	4.90	10.10
Burlington, Vt.	16.90	5.50	10.20
Buffalo, N. Y.	16.20	5.50	10.90
Dover, Del.	16.70	5.50	12.20
Hartford, Conn.	15.60	4.50	10.00
Manchester, N. H.	17.30	5.50	12.10
Newark, N. J.	15.20	4.50	10.00
New York, N. Y.	16.10	5.50	10.10
Philadelphia, Pa.	16.20	5.50	11.90
Pittsburgh, Pa.	16.70	5.50	12.20
Portland, Me.	16.30	5.50	10.20
Providence, R. I.	15.00	4.50	9.90
Washington, D. C.	15.20	4.50	11.20
Average 14 cities	16.02	5.14	10.85

(All prices undivided dealer basis.)

CENTRAL

(Standard Oil Co. of Indiana, Standard Oil Co. of Ohio, Continental Oil Co. and Texas Co.)

	Dealer tank wagon	Combined tax	Kero tank wag.
Chicago, Ill.	14.10	4.50	10.60
Cleveland	15.00	5.50	*9.80
Dallas, Tex.	13.80	5.50	7.80
Des Moines, Iowa	14.40	4.50	10.10
Detroit, Mich.	14.40	4.50	10.60
Fargo, N. D.	16.90	5.50	11.80
Huron, S. D.	16.30	5.50	11.00
Indianapolis, Ind.	15.00	5.50	10.10
Little Rock, Ark.	17.80	8.00	10.80
Milwaukee, Wis.	16.10	5.50	10.80
Minneapolis, Minn.	15.90	5.50	10.60
Omaha, Neb.	15.40	6.50	9.80
Tulsa, Okla.	16.50	7.00	8.80
Wichita, Kans.	13.30	4.50	8.70
Average 14 cities	17.46	5.97	9.94

*Includes 1-cent state tax.

SOUTHEASTERN

(Standard Oil Companies of New Jersey, Kentucky, and Louisiana)

	Dealer tank wagon	Combined tax	Kero tank wag.
Atlanta, Ga.	18.00	7.50	*11.50
Birmingham, Ala.	18.50	8.50	9.00
Charleston, S. C.	18.95	7.50	...
Charleston, W. Va.	19.25	6.50	13.20
Charlotte, N. C.	20.10	7.50	11.20
Jacksonville, Fla.	18.90	8.50	9.80
Jackson, Miss.	17.50	7.50	†9.00
Louisville, Ky.	16.50	6.50	8.80
Memphis, Tenn.	17.90	8.50	10.80
New Orleans, La.	17.75	8.50	10.00
Norfolk, Va.	17.45	6.50	12.20
Average 11 cities	18.34	7.50	10.50

*Includes 1-cent state tax.
†Includes ½-cent state tax.

MIDWESTERN

(Continental Oil Co.)

	Dealer tank wagon	Combined tax	Kero tank wag.
Albuquerque, N. M.	17.50	7.50	10.00
Boise, Idaho	20.10	6.50	16.50
Casper, Wyo.	17.00	5.50	12.00
Denver, Colo.	14.50	5.50	11.00
Helena, Mont.	17.00	6.50	13.00
Phoenix, Ariz.	18.50	6.50	12.50
Reno, Nev.	17.50	5.50	13.50
Salt Lake, Utah	18.50	6.50	14.50
Average 8 cities	17.58	6.25	12.88

PACIFIC COAST

(Standard Oil Co. of California)

	Dealer tank wagon	Combined tax	Kero tank wag.
Portland, Ore.	17.00	6.50	13.20
San Francisco, Calif.	14.50	4.50	11.80
Seattle, Wash.	17.00	6.50	13.80
Average 3 cities	16.17	5.83	13.60
Average 50 cities	16.59	5.96	10.98

California

(Continued from page 91)

Oil Co., which discovered the West Raisin City field. Unlike the log of the discovery well, the log of Shell's 1-1 San Joaquin showed 20,000,000 cu. ft. of gas in the Miocene. The discovery well produces from the underlying Eocene.

LOS ANGELES BASIN

Los Angeles County.—Federal Oil Co., which proved the existence of Miocene production in the northwest end of Inglewood field, has started another well on the Smith property. Coincident with the starting of drilling operations on this well, Jergins Oil Co. 3 Howard, died and will probably have to go on pump. South of this area, Standard Oil Co. of Texas is making hole at 6,000 ft. in 28 Rubel, which is scheduled to test the Sentous zone of Miocene age. Across the Inglewood fault in the east segment of the structure, Standard Oil Co. of California is having trouble with 105 Baldwin-Cienega, which is in the Sentous zone where circulation was lost several days ago.

Orange County.—Huntington State Co., which a short time ago secured a lease from the State of California for development of the Jones sand in certain parts of the field and the lower zone in the eastern end, found out this week that no production could be expected in the extreme eastern part of the structure as it has abandoned 2 State as a dry hole. This well was drilled to test some faulting theories. The Jones or upper zone was barren and the lower zone was gray sand.

COASTAL DISTRICT

Los Angeles County.—Standard of California is drilling several important wells in the Newhall-Castaic region in western Los Angeles County. The company's most successful completion in this area was 1 Sesnon in the deep Miocene zone almost 1 mile west of nearest production in the Aliso Canyon field. Completion of this well extended the limits of Aliso Canyon and now Standard of California has moved still further west and is working on a test on the Frew property in 29-3n-16w. Recently the company decided to drill another test about midway between 1 Frew and 1 Sesnon on the Del Aliso property. The eastern limits of production have been defined but the western extent of Aliso Canyon remains to be determined.

CALIFORNIA WILDCAT COMPLETIONS

Burrel wildcat district, Fresno County: General Pet. 1 Burrell, 2-17s-18e, abandoned as unproductive, T.D. 9,400 ft., P.B. 6,527 ft., gun perf. 6,510-20 ft., recovered salt water, gun perf. 6,242-48 recovered salt water, gun perf. 6,168-73 ft. recovered salt water.

Firebaugh, Madera County: Texas Co. 1-7 Moffatt, 7-12s-15e, flowed gas, no oil, T.D. 4,308 ft., interval 3,954-65 ft. flow 2,400,000 cu. ft. 16/64-in. choke, pressure 1,600 lb., 4,765,000 cu. ft. through 24/64-in. bean, pressure 1,588 lb., 7,070,000 cu. ft. through 32/64-in. bean, 1,575 lb. pressure, interval 3,920-35 ft. flowed 6,500,000 cu. ft. pressure 1,452 lb., completed in Gill zone of Eocene age, discovers new gas field.

Holt district, San Joaquin County: Standard of California 1 Holt Community, 15-1n-5e, abandoned, T.D. 5,319 ft., form. test 5,296-5,315 ft. recovered 2,200 ft. mud and salt water, green sand 4,418 ft., Capay sand 4,885 ft., McDonald Island sand 5,306 ft.

McClung, Kern County: Continental 1-G Kern County Land, 4-30s-26e, flowed 265 bbl., 29.7-gravity, 212,000 cu. ft. gas, 64/64-in. bean, T.D. 8,134 ft., P.B. 7,535 ft., completed in Stevens sand of Miocene age, opens new field.

Round Mountain, Kern County: Bandini Petroleum Co. 1 Signal Mills, 24-28s-28e, pumped 137 bbl. 14.5-gravity, 3.8 per cent cut, T.D. 2,435 ft., 80 mesh perf. 2,420-35 ft., completed in Vedder zone of Miocene age, opens new field 1 mile west of Round Mountain.

Thornton, Sacramento County: Amerada 1 Housken, 28-5n-5e, flowed 6,852,000 cu. ft. gas, no oil, ⅝-in. disc, flowing pressure 842/1,350 lb., shut-in pressure 1,375-1,375 lb., T.D. 6,003 ft., P.B. 3,350 ft., perf. 5½-in. casing 3,285-3,350 ft., extends Thornton gas field 2 miles northwest or is discovery.

Whittier district, Los Angeles County: Barnsdall 1 Baldwin, 11-2s-11w, abandoned, T.D. 2,983 ft., test of minor showings 2,373-2,448 ft. showed salt water, no oil or gas.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, General Land Office, District Land Office, Cheyenne, Wyoming. Notice is hereby given that the lands herein described within the known geologic structure of the East Lance Creek oil and gas field, Wyoming, are offered to qualified bidders of the highest amounts offered per acre as a bonus for the privilege of leasing the land under section 17 of the leasing act as amended by the act of August 21, 1935 (49 Stat. 674, 30 U. S. C. 226) at a sale to be held in the District Land Office at Cheyenne, Wyoming, at 10 a.m. on October 14, 1943, in the following units: Parcel No. 1, T. 36 N., R. 64 W., sec. 28, W½SE¼; Parcel No. 2, T. 36 N., R. 64 W., sec. 29, E½ SE¼. Each lease will be made subject to the unit plan for the East Lance Creek Unit Area, Wyoming, approved March 2, 1938. Each successful bidder must deposit on date of sale with the officer in charge of the sale a certified check or cash for one-fifth of the amount bid by him and file a showing of qualifications to receive a lease as required by section 7 of Circular 1386. The remainder of the bonus bid and annual rental at the rate of $1 per acre must be paid and a $5,000 corporate surety bond must be furnished prior to the issuance of the lease. Each parcel will be offered for sale separately. In the even the same bidder is the successful bidder on both parcels, he may consolidate them into a single lease since the total acreage does not exceed 640 acres. Bids may also be submitted by mail provided they are accompanied by one-fifth of the bonus bid and a showing of qualifications of the bidder. The envelope must be plainly marked for opening on the day and hour of the sale. Bidders are warned against violation of section 59, United States Criminal Code, approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids in the discretion of the Secretary of the Interior. William G. Johnson, Register.

LEGAL

OIL AND GAS LEASE

U. S. DEPARTMENT OF AGRICULTURE, Farm Security Administration, Dallas, Texas: Sealed bids, in triplicate, will be received until 2 o'clock p.m., (cwt) Friday, October 22, 1943, and then publicly opened, offering bonus for operating rights in connection with oil and gas leases on lands in the Texas Farm Tenant Security Project, consisting of 214.453 acres, located approximately 6 miles southeast from the town of Pilot Point, Denton, County, Texas, and being a part of the Isaac Walters Survey. Award of lease will be made to bidder who can show sufficient experience and financial resources and prove citizenship. Interested parties may obtain bid documents, lease forms and operating regulations from the office of the Regional Business Manager, Farm Security Administration, Parry Avenue at Commerce, Dallas, Texas.

CRUDE-OIL PRICES

Representative selected crude prices from all sections of the country appear below:

East Texas	$1.20
Conroe	1.43
Tepetate, Louisiana	1.18
Illinois basin	1.37
Pecos County, Texas	.95
Bradford, Pennsylvania	3.00
Van, Van Zandt County, Texas*	1.00

*No change since 5-21-41.

Gravity Schedules

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity—	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Texas	West Texas*
18-18.9	$0.80	....	....	...
19-19.9	.84	....	$1.06	$0.70
20-20.9	.88	$0.85	1.08	.73
21-21.9	.92	.87	1.10	.74
22-22.9	.96	.89	1.12	.76
23-23.9	1.00	.91	1.14	.78
24-24.9	1.03	.93	1.16	.80
25-25.9	1.07	.95	1.18	.83
26-26.9	1.11	.97	1.20	.84
27-27.9	1.15	.99	1.22	.86
28-28.9	1.18	1.01	1.24	.88
29-29.9	1.20	1.03	1.26	.90
30-30.9	1.23	1.05	1.28	.92
31-31.9	....	1.07	1.30	.94
32-32.9	....	1.09	1.32	.96
33-33.9	....	1.11	1.34	.98
34-34.9	....	1.13	1.36	1.00
35-35.9	....	1.15	1.38	1.02
36-36.9	....	1.17	1.40	1.04
37-37.9	....	1.19	1.42	1.06
38-38.9	....	1.21	1.44	1.08
39-39.9	....	1.23	1.46	1.10
40 and above	....	1.25	1.48	1.12

*Includes Lea County, New Mexico.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, General Land Office, District Land Office, Cheyenne, Wyoming. Notice is hereby given that the land herein described within the known geologic structure of the East Lance Creek oil and gas field, Wyoming, is offered to the qualified bidder of the highest amounts offered per acre as a bonus for the privilege of leasing the land under section 17 of the leasing act as amended by the act of August 21, 1935 (49 Stat. 674, 30 U.S.C. 226), at a sale to be held in the District Land Office at Cheyenne, Wyoming, at 10 a.m. on November 4, 1943, as a single parcel: T. 36 n., R. 64 W., sec. 28, S½NW¼. The lease will be made subject to the unit plan for the East Lance Creek Unit Area, Wyoming, approved March 2, 1938. The successful bidder must deposit on date of sale with the officer in charge of the sale a certified check or cash for one-fifth of the amount bid by him and file a showing of qualifications to receive a lease as required by section 7 of Circular 1386. The remainder of the bonus bid and annual rental at the rate of $1 per acre must be paid and a $5,000 corporate surety bond must be furnished prior to the issuance of the lease. Bids may also be submitted by mail provided they are accompanied by one-fifth of the bonus bid and a showing of qualifications of the bidder. The envelope must be plainly marked for opening on the day and hour of the sale. Bidders are warned against violation of section 59, United States Criminal Code, approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids in the discretion of the Secretary of the Interior. William G. Johnson, Register.

Equipment Progress

One Millionth Fisher Controller Goes Into Service

Typical of the hundreds of thousands of Fisher Governor Co. automatic controllers that are serving

critical war industries is the Fisher Type 435T controller, Serial 1,000,000, recently installed in a new aviation-gasoline plant in Kentucky.

The one millionth Fisher controller was unveiled at a Coca Cola Spotlight Band Blue Network broadcast from Marshalltown, Iowa, on July 14 in honor of the Army-Navy "E" award to Fisher employes. N. T. Chadderdon, president, Fisher Governor Co., with other employes is pictured with the one-millionth Fisher controller.

Trade Literature

%Proportioneers, Inc.%, 9 Codding Street, Providence, R. I.—Bulletin No. 1700, which in addition to illustrating and describing the complete line of the company's constant rate of flow responsive proportioning equipment, contains many flow diagrams showing applications for the process industries.

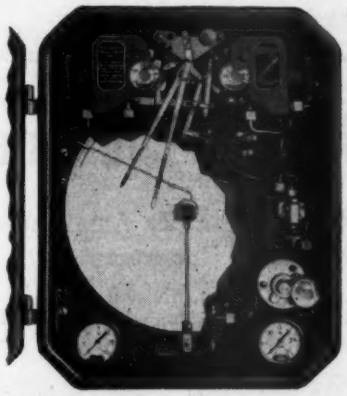
Circular Tool Co., Inc., Providence, R. I.—Catalog K, which illustrates and describes circular metal-cutting saws. The catalog has 36 pages.

Reading-Pratt & Cady Division, American Chain & Cable Co., Inc., Bridgeport, Conn.—Chart 9½ by 12¼ which is designed to take the mystery out of valves for the many new maintenance workers in industry today. Simplicity is the keynote of the chart, which breaks down valves into four basic types. Simple, visual line illustrations explain what service the four types of valves perform, and how they operate.

Automatic Temperature Control Co., Inc., 34 East Logan Street, Philadelphia 44, Pa.—Catalog A4, covering ATC Type 2 automatic valve operators. Profusely illustrated with photographs and drawings, it covers essential engineering information, design features and operating data.

Taylor Introduces Pneumatic Set Controller

Recently there has been an increasing demand for a dependable controller whose control point, as indi-

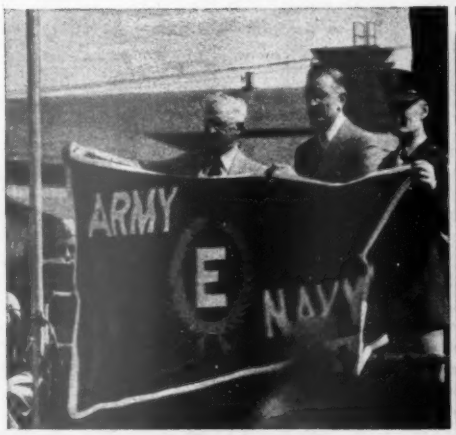


cated by a set pointer, would be automatically adjusted by variations in output air pressure from another remotely located instrument, which may be an indicator, recorder, or controller. For this reason, the pneumatic set controller, now being introduced by Taylor Instrument Companies, Rochester, N. Y., was developed in both the indicating and recording forms. This controller is fundamentally a Fulscope controller with an additional unit to convert changes in input air pressure into linear movements of the set pointer. The magnitude of the linear set pointer movement per pound change in input air pressure is governed by the setting of the adjustment dial provided in this unit. The unit also provides for set pointer adjustments in either direction for an increase in input air pressure, and for limiting the travel of the set pointer within given limits. The instrument is also equipped with a manual set pointed adjustment feature.

The pneumatic set controller has proven its versatility in a large variety of control applications where the set pointer of the controlling mechanism must be automatically and continuously adjusted in relation to variations in some other controlled or uncontrolled process variable.

BAKER OIL TOOLS WINS "E" FLAG

Colorful ceremonies, attended by some 700 persons, marked the recent presentation to Baker Oil Tools, Inc.,

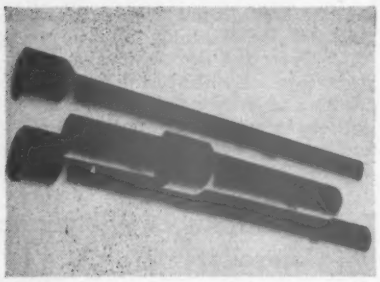


at 6000 South Boyle Avenue, Los Angeles, Calif., of the Army-Navy "E" flag for "excellence in the production of war material."

The presentation was made by Col. K. B. Harmon, chief, San Francisco ordnance district, to R. C. Baker, president, representing the company, and Betty Rice, C. A. Jensen and A. C. Pazdernik, representing the employes.

New Asbestos Cement Pipe

Usco, an asbestos cement pipe with bell collar and spigot joint, or flexible joint, comes in sizes from 2 to 6 in. in diameter, and 8 ft. 6 in. long,



and from 4 to 24 in. in diameter, in 13 ft. 6 in. long, for the transportation of water, sewerage, salt or sulfur water, and electric conduits.

For high-pressure pipe up to 550 lb. working pressure, with or without bell collar and spigot joint, a thin steel lining prevents seepage in the transportation of gas and oil.

The joints on steel-lined pipes are welded in the same manner as standard steel pipes, and are suitable for all standard fittings. The completed pipe is smooth on the inside as well as in the surface.

The pipe is cut with ordinary standard tools, as it is manufactured under a semidry process. No priorities on raw materials are required.

By winding the layers, one liquid and one dry alternately, around a mandrel, the asbestos fiber acts as a strong reinforcement for the pipe in the same way metal would, and binds the fine parts of cement so that no waste can occur.

Fittings are of standard size, and corrugated sheetings are produced under the same semidry process. The patents on the Usco pipe are controlled by U. S. Asbestos Cement Pipe Co., 50 Church Street, New York, N. Y.

Among Equipment Men

National Supply Announces Personnel Changes

R. W. Gordon, division manager of the Texas division, will assume the duties of manager of oil-field sales

R. W. GORDON

J. M. THOMPSON

with headquarters at Toledo, Ohio, on October 1. Mr. Gordon has been affiliated with National Supply Co. since 1917 and formerly served as division sales manager of the company's Mid-Continent organization at Tulsa.

James M. Thompson, Texas tubular manager at Fort Worth, succeeds Mr. Gordon as division manager of the Texas division. Mr. Thompson affiliated with National in 1940 following a tenure of 6 years of service with Norvell Wilder Supply Co. as representative in Texas and Oklahoma.

Wickwire Spencer Names Export Sales Manager

Wickwire Spencer Steel Co. has announced the appointment of Matthew R. Rosse as sales manager, export division, succeeding W. H. Lynn.

Mr. Rosse is a native of Glasgow, Scotland, who was raised and educated here in the United States. He has had more than 25 years' continuous experience in the exportation of steel products and industrial equipment.

Mr. Rosse has traveled extensively abroad, especially in Europe and the Latin-American countries.

Prior to joining Wickwire Spencer, he was for the past 8 years assistant export manager of American Chain & Cable Co.

Mr. Rosse will be located in the company's general offices at 500 Fifth Avenue, New York 18, N. Y.

Alvarez South American Representative for Westinghouse

Appointment of Adolfo Alvarez as general South American representative of Westinghouse Electric International Co. has been announced by John W. White, the company's vice president and general manager.

Mr. Alvarez will devote special attention to formulation of plans to put all company activities in the South American countries in position to meet war emergency conditions and postwar requirements. A citizen of Argentina, Mr. Alvarez is also vice president of Cia. Westinghouse Electric International, a South American subsidiary of the International company.

In addition to his posts as vice president of Cia. Westinghouse Electric International, Mr. Alvarez is a director of S.I.A.M., DiTella, Ltda., a company in Buenos Aires which manufactures electrical equipment under Westinghouse license. He will make his headquarters in Buenos Aires.

Dietz Heads Allis-Chalmers Machinery Export Sales

PAUL DIETZ

Paul Dietz has been appointed export sales manager for the general machinery division of Allis-Chalmers Manufacturing Co., it has been announced by William C. Johnson, general sales manager. Mr. Dietz comes to Allis-Chalmers from the export division of B. F. Goodrich Co., Akron, Ohio. During the 15 years he was with the Goodrich, he was stationed in Mexico, China and French Indo-China. He was in Hong Kong when it fell to the Japanese, returning to this country following negotiations between the State Department and the Japanese Government.

At Allis-Chalmers he will take the position left vacant by the death of Harlow Bradley.

Lewis Joins Foster Wheeler Publicity Department

Joseph W. Lewis, Jr., formerly of Atlantic Refining Co., Alcorn Combustion Co., and the inventor of the side-stream stripper, is now associated with Foster Wheeler Corp. in the publicity department. Mr. Lewis also has been newscasting for Uncle Sam. His was the first English voice to short-wave the news of the invasion of Sicily.

Steinkamp Assistant Sales Manager, Brown Instrument

W. H. Steinkamp has been appointed assistant general sales manager of Brown Instrument Co., a division of Minneapolis - Honeywell Regulator Co. During the past 13 years Mr. Steinkamp represented the Brown company in New York, Buffalo and Pittsburgh, where he served as branch manager. He will make headquarters at the company's main office in Philadelphia.

Classified Advertising

EQUIPMENT FOR SALE

CONSTRUCTION Equipment For Sale Eighty-five per cent of new cost. Factory rebuilt.

2—TA-40 wide gage International Tractors equipped with Trackson Pipe-layers.
2—R-5 wide gage, wide track Caterpillars equipped with Cardwell Pipe-Layers.
1—Model D Buckeye Back-Filler.
2—TD-18 International Tractors wide gage equipped with Bucyrus Erie Hydraulic Angle Dozer.
1—Caterpillar 40—Gas.
1—Caterpillar 50—Gas.
1—D-6 Tractor.
1—D-8 Caterpillar equipped with Trackson Pipe-Layer.
1—D-7 New Styler Caterpillar equipped with Trackson Pipe-Layer.
1—R-4 Caterpillar equipped with Trackson combination Pipe-Layer and Angle Dozer.
1—Model 32 Buckeye Ditching Machine Wheel type equipped with 21-inch bucket now. Has extra set 14-inch buckets. Will cut up to 33½-inch width.
1—Model 12-A Buckeye Ditching Machine Wheel type equipped with 14-inch bucket. Has extra set of 10-inch buckets.
1—R-5 wide gage Caterpillar Tractor equipped with La Plante Choate Hydraulic Angle Dozer.
1—Chicago Pneumatic Air Compressor, 105 feet. 2 Stage.
7—500 gallons Standard Paint Pots.

All this equipment in first-class condition. Available at once. For information rearding the above described equipment, please refer to M. L. Heard or H. V. Bell. 504 First Nat'l. Bank Bldg., Hamilton, Ohio.

1—80 H.P. Bessemer Type 8 Direct Connected Compressor.
1—50 H.P. Bessemer Type E.C. with 48" Clutch, 14" face, both rebuilt.
1—Ingersoll-Rand Compressor 14" x 7" x 14"
W. S. Smith, 205 Thompson Bldg., Tulsa, Oklahoma. Phone 2-5473.

FOR SALE at Oklahoma City 100 2" unrepaired Fig. 2505 Flanged Merco Plug Valves. 1500# W.P., Jewel Steel. $12.50 each. Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.

FOR SALE—Complete slim hole rotary outfit, 85' Portable Derrick, three new Allis-Chalmers L-90 engines, 3,000' of 4½" drill pipe, and O.W.S. oil bath rotary table, all in A#1 condition. Located Oklahoma City, Okla. Thos. Whelan, 2612 First Natl. Bldg., Oklahoma City, Okla.

FOR SALE: Star Rig, first-class condition, complete with 60 tractor. H. E. Barker, 3446 E. 7th St., Kansas City, Mo. Ch.0701.

FOR SALE: Climax Reverse Clutch Model R 6 U, Type 55. Good shape. Priced right. 1702 Transit Tower, San Antonio, Tex.

1—#25 Southwestern Distillation Unit, completely rebuilt.
1—60" x 30' Southwestern Absorber, 15 Trays. 75# W. P.
W. S. Smith, 205 Thompson Bldg., Tulsa, Oklahoma. Phone 2-5473.

FOR SALE at Oklahoma City one 65 HP Broderick Code LFB Boiler suitable for heating or treating. Price $150.00. Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.

Used Engines and Compressors
We Rebuild and Guarantee
L. F. SMITH CO.
217 W. Archer, Tulsa, Okla.

EQUIPMENT FOR SALE

WE offer at our Okmulgee, Okla., refinery the following:
9—Riveted Horizontal Steel Tanks, size 5'6" x 25' to 8' x 30'.
20—Small Vertical Riveted, suitable for production tanks.
5—4' x 20' Vertical Riveted Scrubber Tanks. Would make gun barrel or run-down tanks.
3—Small Scrubber Tanks, used in tail gas plant.
4—5' and 6' x 30' Vapor Towers.
4—Badger Towers.
5—10' x 30' Crude Stills.
1—12' x 32' Crude Still.
5—14' x 32' Crude Stills.
1—Green Fuel Economizer.
Patridge, Cities Service Oil Co., Bartlesville, Okla.

LARGE Sullivan Core Drill. Also adaptable to comparatively deep slim hole drilling. Not on truck. Some accessories. Box B-814, The Oil and Gas Journal, Tulsa, Okla.

ELECTRIC POWERED ROTARY DRILLING RIG

Complete, in good operating condition; just off 7,460' Oklahoma well. 2—300-h.p. Sterling gas/butane engines with Marley cooling tower, driving 2 Westinghouse D.C. generators; EMSCO H46 draw works and 25½" roller bearing table, driven by 150/300 h.p. Westinghouse motor through Link Belt speed reducer; 7¼ x 18 Wilson Synder pump, driven by 200-h.p. Westinghouse motor. Exciter, cooling fans and motors, wiring, switchboard. With or without 7,000' 3½" OD drill pipe, excellent condition; 6,500' 4½" OD drill pipe, fair condition. At Seminole, Okla. PIONEER DRILLING COMPANY, 738 Kennedy Bldg., Tulsa, Okla.

FOR SALE: At Barnsdall Okla., approximately 100 Type R Wico Igniters. Take all "as is," $1.00 each. Patridge, Cities Service Oil Co., Bartlesville, Okla.

FOR SALE: 1,500'—7"—17 & 20 lbs. T. & C., suitable for shallow wells or line, 45c. 2,000' 4⅞" casing suitable for line, liners or water wells, 40c. 3,000' No. 1 3", 25c. 1,500' 6¼" casing, plain end, 40c. M. J. Regan, Phone 448, Coffeyville, Kans.

FOR SALE: Near Arkansas City, Kans., 1—25 H.P. Ohio Single Cylinder Gas Engine. $150.00. Patridge, Cities Service Oil Co., Bartlesville, Okla.

FOR SALE: In Kansas 1 #10 Adams Leaning Wheel Grader. Steel wheels and tractor hitch. $650.00. Patridge, Cities Service Oil Co., Bartlesville, Okla.

FOR SALE: Refinery equipment. Hi-pressure steel valves and heavy 12" steel pipe, plain ends. List on request. HARVEY BROTHERS, Parkdale, Colo.

FOR SALE at our El Dorado, Kansas, warehouse: 50,000 feet of 2" used threaded and plain-end pipe, $35.00 per net ton. Cities Service Oil Co., Patridge, Bartlesville, Okla.

ONE Keystone Pump Head—1½" Rod, 3¾" Working Barrel. Excellent condition. Write Box 1624, Huntington, W. Va.

FOR SALE

Refinery, 750 Barrels Crude Capacity. Includes Pipe Still, Batch Still, Oil to Oil Heat Exchangers, 24" x 65' Fractionating Tower, Condensers, Pumps, Control Houses, Cooling Towers, Boilers, Piping and Tanks. All completely renovated, and boilers retubed. Located near railroad switch and easy to dismantle. Terms Cash.

THE JEANITE CORPORATION
9650 Rheem Ave., South Gate, Calif.

EQUIPMENT FOR SALE

Cross Reaction Chambers

2—60" O.D. x 44' x 4" Thickness Vessels, Hammer-Welded Construction, Fabricated by Krupp. Available for immediate delivery. Price on application.

Wire, Phone or Write

REFINERY EQUIPMENT, INC.
Tulsa 1, Okla.

COMPLETE Drilling Rig, Steel Derrick Good condition. Make offer. Mrs. Charles L. Staub, Smithville, Tex.

EQUIPMENT WANTED

WANT TO BUY

Complete Bulk Storage Plants from 20,000 Gal. Cap. to 200,000 Gal. Cap.

Please describe Tanks, Pumps, Racks and Trucks

R. C. STANHOPE, Inc.
60 East 42nd. St. New York, N. Y.

ANYONE having Bucyrus-Erie 36L or Fort Worth super D or Jumbo D spudder for sale, write Updike Brothers, Osage, Wyo. Spudder must be in good condition.

FINANCING

CAPITAL SEEKERS—Interested in raising $25,000 or more for a legitimate project should write to AMSTER LEONARD, Fox Theater Bldg., Detroit 1, Mich.

TO FINANCE: Have two Oil Well Inventions, patented. Will give interest to finance. Write Box 269, Smithville, Tex.

LEGAL BLANKS

OIL FIELD LEGAL BLANKS
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Larger Ocean Tanker Shipments Are Possible

NEW YORK.—John A. Brown, president of Socony-Vacuum Oil Co., Inc., said here last week that not only had lost transportation facilities been made up, but the industry is "prepared to bring into the eastern area an average volume of petroleum products close to the peak shipments prior to the war."

Mr. Brown said the United States rapidly was "developing the greatest tanker fleet in history."

"Because these new tankers have greater capacity and greater speed than the old tankers," Mr. Brown said, "the total annual carrying capacity of the ships delivered by the end of this year will probably equal the entire American tanker fleet of some 400 tankers in the prewar period."

Allis Co., Louis 48-A, 48-B
Autocar 36-A
B and W, Inc. 92
Babcock & Wilcox Tube Company, The 44
Baroid Sales Division, National Lead Company 50
Beech Aircraft Corp. 35
Bethlehem Steel Co. 1
Buda Co., The 2
Cable, Jo H. 70
Cameron Iron Works, Inc. ..... Inside Front Cover
Classified Advertising 101-102-103
Climax Molybdenum Company 16
Coffing Hoist Co. 75
Consolidated Engineering Corp. 48
Continental Supply Company, The 46
Dean Brothers Pumps, Inc. 72
Diamond Chain & Mfg. Co. 36-A
Ensign Carburetor Co., Ltd. 85
Flanders Construction Co. 92
Floridin Co., Inc. 87
Foreman Co., C. S. 75
Franks Mfg. Corp. 89
Fraser-Brace Engineering Co., Inc. 70
Gray Processes Corporation, The 87
Hanlon-Buchanan, Inc. ..... Front Cover
Houston Ready Cut House Co. 72
Hughes Tool Co. ..... Back Cover
Jerguson Gage & Valve Co. 83

ADVERTISERS IN THIS ISSUE

Johns-Manville 52
Kellogg Company, The M. W. 6
Lane-Wells Company 84
Lufkin Rule Co. 90
McCullough Tool Co. 14
McDermott, Tom P., Inc. 86
Macwhyte Co. 3
Martin-Decker Corp. 92
Midwest Piping & Supply Company, Inc. 73
Murray Iron Works Co. 71
National Airoil Burner Co., Inc. 70
National Tube Co. 60
Nordberg Mfg. Co. 12-13
Oil Well Improvements Co. 95
Oliver United Filters, Inc. 9
Oils Pressure Control, Inc. 10-11
Patterson-Ballagh Corporation 88
Perco Division of Phillips Petroleum Co. 66
Pipe Line Service Corp. 74
Pittsburgh Steel Company 41
Porter Co., Inc., H. K. 36-B
Reading-Pratt & Cady Division of American Chain & Cable Co. 64
Rector Well Equipment Co. 93
Reed Roller Bit Company 76
Schlumberger Well Surveying Corp. 33-A, 33-B
Seismograph Service Corp. 36-B
Sharman and Allen 75
Shell Development Co. 5
Smith Oil Tool Co., H. C. 92
Spang-Chalfant—Division of The National Supply Co. 54-55
Sturtevant Co., B. F. 82
Templeton, Kenly & Co. 93
Texas Electric Steel Casting Co. 7
Toledo Pipe Threading Machine Co., The 85
United Construction Co. 75
United States Government (Treasury Dept.) 8
Universal Oil Products Co. 38
Vinson Supply Co. 78
Visco Products Company, Inc. 42
Vogt Machine Co., Henry 4
Weatherford Spring Co. 93
Webster Engineering Co., The 53
Wheeling Machine Products Company 71
Youngstown Sheet & Tube Co. ..... Inside Back Cover
Zink Co., John 82

Journalisms:

MUCH has been written about corrosion by anaerobic bacteria and how they live by extracting the oxygen from sulfates, forming corrosive sulfides in the process. Sometimes other forms of corrosion are attributed to these organisms. In next week's issue, Dr. C. L. Clark, Timken Roller Bearing Co., will show how this form of corrosion can be identified and how it may be prevented. He even has a photograph of the bug that does the damage.

DESPITE the fact that petroleum engineers are on the "essential" list and are, therefore, not subject to draft, the Army has taken large numbers and may take more. A great many were reserve officers and the engineering training of all of them has placed them on the Army's preferred list. How oil companies can train nontechnical men to handle many of the jobs that engineers now do will be discussed in a staff article in next week's Engineering and Operating Section.

WEEKLY news reports from the oil fields often report shows of oil which do not materialize. Then when the well is finally completed, some weeks later, it has ceased to be "hot news" and many do not know whether a new pool has been opened or another hope has been blasted. Beginning this week, The Journal will carry in the Exploration and Drilling Section a summary of the week's wildcat completions and an appraisal of what the successful ones add to the national oil picture.

THE isolation of many natural-gasoline plants, together with the conditions under which they operate, makes safety precautions even more necessary than in many other types of oil-company operation. Roy A. Schuster, superintendent of gasoline plants, Preston Oil Co., will outline a program leading to greater freedom from accident in next week's Journal.

CALENDAR

October

AMERICAN ASSOCIATION OF OILWELL DRILLING CONTRACTORS, third annual meeting, Houston, Tex., October 5-6.

PETROLEUM INDUSTRY WAR COUNCIL, regular monthly meeting, Washington, D. C., October 6.

TEXAS MID-CONTINENT OIL AND GAS ASSOCIATION, annual meeting, Blackstone Hotel, Fort Worth, Tex., October 13-14.

NATIONAL STRIPPER WELL ASSOCIATION, annual meeting, Blackstone Hotel, Fort Worth, Tex., October 25.

AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS, petroleum division, fall meeting, Ambassador Hotel, Los Angeles, Calif., October 21-22.

INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA annual meeting, Fort Worth, Tex., October 25-27.

PETROLEUM DIVISION NATIONAL ASSOCIATION OF CREDIT MEN, annual conference, St. Louis, Mo., October 25-27.

AMERICAN GAS ASSOCIATION, twenty-fifth annual meeting, Jefferson Hotel. St. Louis, Mo., October 26, 27 and 28.

MID-CONTINENT OIL AND GAS ASSOCIATION, Louisiana - Arkansas division, Slattery Building, Shreveport, La., October 29.

November

AMERICAN PETROLEUM INSTITUTE, twenty-fourth annual meeting. Palmer House, Chicago, Ill., November 8-11.